DR. JAEGER'S

Essays on

HEALTH CULTURE

ENLARGED AND REVISED EDITION.

G. JAEGER, M. D.

ONE SHILLING

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ESSAYS ON

HEALTH-CULTURE

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"The first Wealth is Health."—EMERSON.

PREFACE

TO THE

REVISED AND ENLARGED EDITION.

"PHYSICIAN, heal thyself!" This inward monition first started me on the special path of investigation which has led to the results recorded in these pages. In my youth I was an active, vigorous athlete, but before I was thirty an injury to the leg, accompanied by blood poisoning and followed by varicose veins, rendered all strenuous exertion painful, and condemned me in an ever-increasing degree to a sedentary life. As a consequence, I gradually grew fat and scant of breath; my digestion was disturbed; I suffered from hemorrhoids, and was troubled with a tendency to chill diseases. While my health was in this state I was appointed to lecture on anthropology, in addition to my course on zoology, at the Royal Polytechnic School, Stuttgart. Conformably to my invariable rule to proceed not merely theoretically, but also practically, in whatever I undertake, I determined to choose for my lectures on anthropology the subject of "Health Culture.' But here it seemed to me, sick man as I was, that my lecturing on health was as though a bald-headed person should extol the virtues of a patent "hair restorer;" and this feeling inspired my endeavour to heal myself with the energy requisite to the success which I have achieved.

My success, however, was not attained all at once, and the various short essays, printed in their chronological order, which appeared in the earlier editions of this work, afford to some extent a chart of the route by which I gradually arrived at the reforms embodied in my Sanitary Woollen System.

Since these essays were written the popularity of my reforms has advanced with giant strides, and the experience of many thousands of wool wearers in every country and climate under the sun has added new and valuable information as to the hygienic worth of my System, which has the happy faculty of attracting the enthusiastic interest —I had almost said affection—of those who adopt it.

The sum of this experience is collated in the present edition, which also comprises much fresh matter adopted from my larger technical works on natural science and from my periodical publications. The whole has been carefully revised and re-arranged, and the preface to the earlier editions is equally applicable to the present volume in respect of my endeavour to give to this work a thoroughly popular character.

G. JAEGER, M.D.

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PART I.—PHYSIOLOGICAL.

I.—DISEASE AND HEALTH.

EVERY rule laid down on the subject of Health Culture, whether directed to Cure or to Prevention, can only attain its object when formed on a clear understanding of the *nature* of the two main conditions which are in question—Disease and Health. If the available literature be examined, an immense deal will be found respecting individual diseases, but the simple question, In what, apart from all casuistry, does Disease consist? is nowhere answered; and to an inquiry for a definition of Health there is either no reply, or at most a negative one: a man is healthy when he is not diseased.

Contrast with the helplessness and confusion of the books the promptitude and certainty with which the simplest human being replies to the inquiry as to his state of health, "I am well," or "I am ill."

Health and Disease are conditions of familiar sensation, respecting which a man is as certainly advised in his own mind as respecting every other sensation. So surely as a man knows whether he is hungry or satisfied, sad or

cheerful, tired or full of energy, he knows whether he is ill or well; and, *nota benè*, he is much more precisely informed on this point than the most experienced physician.

If we would now gain some insight into the nature of these two conditions, Disease and Health, we must keep aloof from all casuistry. In the inquiry respecting health this is self-understood, for there is only one health. In the province of disease there is certainly an immense variety; the question, however, is not as to the variety, but as to that which is *common to all diseases.* Let every one examine his own experience. How often does a sick person, when asked what is the matter—*i.e.* from what disease he is suffering—reply, "I don't know"? although he knows very well that he is ill; and how often is the doctor who has been called in no whit wiser? He, too, has no doubt whatever that the man is ill, but he cannot determine the special nature of the disease, and must wait to see how it will turn out, whether typhus, inflammation of the lungs, &c. Clearly, therefore, in this case the specific disease for which the doctor must wait until it declares itself, does not *constitute* the illness, nor is it the cause of disturbance in the general condition; it is rather the consequence of such disturbance. The disturbance in the general condition is always the chief thing, the essential, while the disturbance in particular organs, functions, and secretions—that which the physician terms the localisation—is secondary.

The great defect of ordinary Medical science and practice is that disease is only understood to be present when there is an anatomical change in the coarser mechanism—*i.e.* such as is demonstrable on the body. That which fills the books and journals of our Medical erudition relates almost wholly to the conditions consequent on the circumstance that a wrong *spiritus rector* has interfered with the movement of the bodily machine, and that through this interference the

machine has somewhere or other suffered injury. The essence of the disease is not the injury to the coarser mechanism, but the *spiritus rector*, which has caused the erroneous movement. The position in ordinary Medical practice is this: inasmuch as neither the public nor the physician has a correct insight into the nature of this *spiritus rector*, the patient does not call in the doctor until the injury to the mechanism is already done, instead of seeking his assistance to eject the enemy directly the latter breaks into the house. Hence arises the helplessness of the doctor when he is summoned. An injury to the coarser mechanism, such as inflammation, suppuration, exudation, induration, rupture of blood vessels, &c., cannot, having regard to the great intricacy of the mechanism, be all at once set right. This to some extent excuses medical science: as the patient only calls in the doctor when the cause of the disease has done its mischief, and not when the cause is first in operation, the doctor does not trouble himself about this prior, essential element of the disease, but rather devotes his whole study to the damage which the delinquent has effected. It is as if an incendiary were to force his way into a house, with the intention of setting it on fire: the most important thing to do would be to eject him before he could execute his purpose. If, however, the house be already in flames, the task becomes firstly of quite another character; secondly, much more difficult and lengthy; and thirdly, much more thankless. The object of the discussion on which we are about to enter is, not to portray all possible injuries which may result from a fire, but to teach us to recognise the incendiaries which steal into our bodies to set them on fire, and to acquaint us with the remedies whereby the intruder may be hindered of his purpose, or ejected before he can do much harm. The question now under consideration concerns only the essen-

tial or primary nature of disease and health, and does not therefore deal with the condition of a person who has been diseased for some time, but rather with the incipient condition of an illness which is only commencing.

If we desire to get at the root of the nature of disease and health, we must first seek for their essential characteristics, clearly recognize them, and divide them into two groups—the *subjective*, which enable us to judge respecting ourselves, and the *objective*, which enable others to judge of our condition.

a. THE SUBJECTIVE CHARACTERISTICS: To begin with the *physical* signs, the sick person feels tired, languid, and weak, is uncertain in his voluntary movements, and feels that his temperature is abnormal (too high or too low). The physical sensations of the healthy person are strength, certainty, energy, and the absence of any special feeling as to temperature—he is neither too hot nor too cold. The *chemical* sensations of the sick person are most commonly a disagreeable, unusual taste in the mouth, and satiation, or want of appetite; while the healthy man's palate is clean and his appetite regular.

b. The OBJECTIVE CHARACTERISTICS: The fact that anyone is ill is patent to all the five senses of another person. *Physically*, the observer notes that the voluntary movements* of the patient are slow, irregular. uncertain, and weak; the expression of the face is distorted; the hair is dull and without gloss; not only does the voice sound weaker, but its harshness betokens the irregular movement

* There is a singular contrast between the movements which are voluntary and those which are involuntary (the pulse and the breathing). Whereas the voluntary movements of a sick person are slow, the pulse and the breathing are accelerated; and the converse holds good of a healthy person. This contrast is, however, perfectly natural, because the two classes of movement supplement

of the mechanism; the skin of the patient feels either too hot or too cold, and the flesh is flabby. *Chemically*, the observer smells that the exhalation of the patient has become more intense and mal-odorous; and, if he take the trouble to test the patient's skin with his tongue, he will find that, corresponding with the bad taste in the mouth of which the patient complains, the objective impression on the taste is bad. If we now compare the healthy man, we find his movements to be quick, regular and certain, the expression of the face is regular, the hair is glossy, the voice powerful and clear, the temperature of the skin is normal, the flesh firm, and his exhalation is free from offence to the senses of smell and taste. When we consider the above-named essential characteristics, the views of the prevailing School of Medicine are found to be deficient, as summed up by VIRCHOW'S statement, that "Disease is a dynamic phenomenon." For the differences between Disease and Health are not simply of a dynamic, *i.e.* a physical kind—these conditions can be distinguished not only by means of the eye, the ear, and the touch—but they are equally of a chemical nature, and are patent to our chemical senses. And inasmuch as the prevailing School of Medicine makes no use of the chemical senses in the examination of diseases, but only hears, sees, and feels, it permits the element of matter, whence proceeds the physical disturbance of movement—*i.e.* that which is physical—to escape it; and the School fails to recognise the substance of the disease, the *materia peccans*. I shall

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each other, or, in technical phrase, re-act on each other. So soon as the voluntary movements undergo through disease a laming influence, the breathing and circulation endeavour by accelerated activity to assist the voluntary apparatus: hence the contrast. But in spite of this divergence, the voluntary and the involuntary movements correspond in one particular: in health they are regular, in sickness irregular.

be told that the present School of Medicine pays full attention to the variations in the chemical conditions of health and disease, and has discovered a multitude of *materiæ peccantes*, both in poisonous matters which penetrate from outwards and in those which are formed internally ; and that especially important progress has been made in the province of the material of disease by the discovery of the animate disease germs. In reply, I admit it all, but it is sheer casuistry, as is plainly shown when we ask, What is poison? The well-known answer runs: Everything and Nothing. The nature of poison and of the material of disease is, in the first place, not a matter of *quality*, but purely of *quantity*.

The answer to the question, What is poison? is simply: Everything which is in excess, or too concentrated. It is true that this reply does not free us from casuistry ; for to the inquiry as to what quantity or concentration constitutes the poisonous excess, must be answered, that the poisonous dose varies with every substance. An escape from this casuistry is afforded by what we above learned to know as the chemical characteristics of the conditions of Health and Disease, respecting which characteristics the chemist can give us no explanation: only our chemical senses can do this, through the impressions of taste and smell, subjectively and objectively. Offensive odour and taste characterise the sick person; the converse holds good of the healthy person ; and now remains only the question on what material conditions it depends whether a thing acts agreeably or disagreeably on our chemical senses.

The answer is simple: every substance can smell and taste both agreeably and disagreeably. All sufficiently attenuated matters do the former, and when any one of them reaches a certain degree of concentration, the taste and smell become offensive. Thus a concentration to the degree of generating offensive taste

and smell is characteristic both of a poison and of a disease-matter. We require no figures to demonstrate this; we possess in our senses of smell and taste a certain standard, which frees us from all casuistry, while chemistry has no such standard, and leaves us wholly in the lurch. So soon as we trace disease to a material element, the question naturally at once arises, whether health is also connected with such an element. This question must be answered in the affirmative. A person is healthy when the volatile matters exhaled are, all of them, so attenuated that the exhalation contains nothing mal-odorous. We shall have occasion later to refer to another material element.

It may be objected, while admitting the above explanations as to material elements, that the incidents connected with them are only phenomena attendant on the dynamic —*i.e.* physical—incidents, and are not the causes of the latter. To meet this objection we must first reduce to the simplest phrase the divergences described above, between the movements of healthy and diseased persons, as follows: The voluntary movements of a sick person are slow and irregular, and the involuntary are quick and irregular; a healthy person's voluntary movements are quick, the involuntary moderate, and both are regular. Now comes the question: Are these differences between the vital movements of healthy and sick persons related to the fragrant or mal-odorous nature of the exhalation as above described, and what is this relation? Experience and experiment furnish the reply.

1. Experience with poisons: everything poisonous has a repulsive taste and smell, and the commonest symptoms of poisoning are that all vital movements become irregular, and the voluntary movements slower; while all matters beneficial to health (good air, wholesome food and drink) smell and taste agreeably.

2. My numerous experiments with the Nerve-measurer (see Chap. 9) and Pulse-recorder have established the following:—If an offensive odour be inhaled, the voluntary movements become slower and irregular, the pulse and breathing quicker and irregular; these deviations from the normal condition abate when the evil odours cease to be inhaled and are again breathed out of the body. The converse happens when agreeable odours are inhaled; the voluntary movements are quicker and regular, the pulse and breathing more full, slower, and likewise regular.

The above facts prove the causative connection between the material and physical signs of Health and Disease, and clearly define the nature of these two conditions. This may be expressed in a few telling words:—

Health is Fragrance,
Disease is Stench;

or, from the quantitative point of view,

Health is Attenuation,
Disease is Concentration.

From the point of view of the element of matter, we may say, health- or healing-matters are subtile, fragrant odours; disease-matters, *i.e.*, poisons, are concentrated evil odours.

3. From this foundation proceed, as we shall see in the following, all rules in the province of healing, and of protection against disease.

II.—THE ABSORPTION AND EXHALATION OF GASES.

IF a water bottle, taken from a cool place, be allowed to stand in a warm room, air bubbles will appear on the sides, becoming larger as the water warms; this shows that the cold water has taken up air which it must again give

off when warmed. If, on the other hand, the bottle in which the air bubbles have appeared be returned to a cool place, in proportion as the temperature of the water falls, the bubbles become smaller and smaller, until at last they quite disappear; the air has re-entered the water. This phenomenon, which is termed by Physicists the absorption of gases by fluids, must, for our purpose, be enlarged on in two directions.

The faculty of absorbing air, *i.e.* gases, under cold, and of giving them out again under warmth, is not peculiar to fluids alone, but is also possessed by solid bodies, especially if the latter are porous. It is known, for instance, that platinum absorbs oxygen, and that ordinary earth is able to condense matters out of the atmosphere into itself, whence the employment of earth for deodorising deposits in latrines. The power of charcoal to absorb volatile matters and such as are in a state of solution, is equally well known, and use is made of this power, especially for the filtration of drinking water, &c. It is also true of these solid bodies, that the lower their temperature the more they absorb, and that, when warmed, they give off a portion of what they have absorbed. But there is another factor in the case of solids which is absent in that of fluids. When a solid has absorbed gases, an additional means to expel a portion of these is by wetting it. I will give two common examples. When an ordinary floor of a room is wetted it gives out a disagreeable odour; similarly, when rain has fallen, the earth gives out an odour. These odours disappear so soon as the bodies are again dry.

If we test various kinds of matters—fluids in the first place—we shall find that what they, when in a state of cooling, take up from the air is not always the same; each species of fluid does not attract the ingredients of the air in an equal degree, but invariably evinces a certain preference for one or another element. This has long been

ascertained with reference to the elementary constituents of the air, oxygen and nitrogen, and in respect of a common ingredient of the air, carbonic acid: some fluids attract more of one element, and some of another. The ingredients of the air which we have to consider in relation to our enquiries are the odorous matters, and as regards these it is easy to establish the contrast between water and watery fluids, on the one hand, and oils and fatty fluids on the other. The former have a predilection for the mal-odorous ingredients of the air, and the latter for those that are fragrant. If, for instance, in a room where there are people and flowers, two open vessels be placed, one holding water and the other oil, the water will soon smell and taste offensively. Usually in such a case the water is said to have been "standing too long," but it must not be supposed to have thereby lost any of its properties; the alteration in the taste of the water is due to its attracting to itself the noxious exhalation of the people in the room. This fact has, indeed, led to the recommendation of the use in living and sick rooms of shallow dishes filled with water in order to purify the air.

Oil, on the other hand, shows no such signs of deterioration. Oil may be allowed to stand in an open vessel without acquiring a bad taste; on the contrary if there are fragrant odours in the room, say from flowers, these enter into the oil. For this reason experienced housekeepers leave the bottle of salad oil always uncorked, while they carefully cork all bottles containing watery fluids.* They know that an uncorked watery fluid goes bad, while uncorked

* Milk is also rightly considered a fluid which is better left open than closed. The attraction of fragrant odours by the milk-globules formed of fat exceeds the attraction of evil odours by the watery fluid. This is why the cream tastes better than the milk, and creamy milk better than skimmed milk; the pleasant taste of milk lies in the fat of the milk-globules, and not in the watery whey.

oil always improves, because it does not take up evil odours, but continually attracts from the air fragrant odours.

The contrast may be illustrated by a yet more striking experiment: if one of two roses be placed in water and the other in oil, the oil will extract from the rose only its fragrance, while the water will also extract some of the perfume, but mainly the mal-odorous elements in the rose. It is for this reason that perfumery makers never employ water for extracting perfumes, but always oils, or fats, or glycerine, which is of a fatty nature.

A third convincing proof of this contrast is afforded by pouring a scent into water and into oil. It will rapidly be dissipated from the former, while it will remain in the latter. Hair oil may be allowed to stand open for a long period without the perfume disappearing.

If we now examine how solid bodies are affected in this respect, a similar contrast will be noticed to that between water and oil, as will be seen from the following: Predominating evil odours are absorbed from the air by earth, charcoal, wood, by dead and living plants,* and by all materials of clothing and bedding which proceed from the vegetable kingdom, such as linen, cotton, jute, &c.; the non-vegetable material silk may be added to these.†

* The attraction of evil odours by living plants is the cause of their healthful influence on us, and, on the other hand, everything mal-odorous is a form of manure. The living air-cleansing plant assimilates the evil odours, and in that way definitely disposes of them; the dead plant or vegetable fibre continues to attract such odours, but cannot assimilate them, and therefore deals with them in the manner subsequently described.

† It is of interest to note that while silk may be said to appertain to the animal kingdom, it is only the excrescence of a worm, not a product devised by nature as clothing material for the creature which produces it; and it does not possess the natural virtues of animal fibre such as wool, hair, &c., which may be termed the "survival of the fittest" clothing materials.

Animal fibres, however, viz., wool, hair, leather, feathers, only absorb these evil odours when impregnated with vegetable extracts (such as tan and most dyes used for clothing materials.)

Fragrant odours are attracted from the air in a pre-eminent degree by all animal fibres constituted of horny substance, as wool, hair, feathers, horn, hoofs, and white or tawed leather, but in every case only when the material has not been impregnated or dyed with vegetable extracts. Lastly, the vegetable substances, wood, linen, cotton, &c., named above as absorbing evil odours, may, by impregnation with oils, fatty substances, rosin, and varnish, be deprived of all power of attracting such odours, and be so transformed as only to attract the more fragrant matters.

Now for the connection between the foregoing explanation and that in the previous chapter. We there found that disease is stench, fragrance is health- or healing-matter; and we have just seen that the materials which we have on and around us, partly as clothing and bedding, partly as furniture, &c., are separated into two groups, in one of which evil odours are preserved, in the other fragrance. It seems, therefore, that these materials may also be divided into two classes: 1. That which is noxious or dangerous to health, viz., vegetable fibre stuffs; plain, unpainted, unvarnished wood; silk; and tanned leather; 2. That which is conducive to health, viz., undyed animal fibres, wool, hair, feathers, tawed leather, and varnished wood. In order, however, to form an exact conception of the effect of these two classes of materials on the health, we must first study, in the next chapters, the nature of the exhalation of the human body, and the functions of the skin.

III.—THE BODY'S EXHALATION.—I.

I DEFINE the physical source of the emotions to be subtile essences bound up with, and emanating from, the albumen in the bodily tissues. These essences may be divided into two main classes or principles, which are opposed to one another in the effect which they produce, and which may be distinguished by the terms "salutary" and "noxious." In a condition of mental equanimity or composure these principles are inactive, and only when a decomposition of albumen in the tissues occurs are they set free; they then become perceptible to the senses, especially to that of smell, and create in the body in which they take rise that which is called emotion, or mood.

When essence in the form of the "salutary" principle is liberated, the emotions or mood are cheerful, enterprising, and courageous, and the body enjoys food; but if the form be that of the "noxious" principle, there are gloom, depression, want of courage, and a distaste for food.

Mental equanimity or composure is restored when the essences cease to be liberated, and when the portion set free has been removed from the body by means of the respiration, cutaneous exhalation, or the other excretions.

As I have said, these essences can be smelled, and are otherwise palpable to the senses. My readers may obtain evidence of this for themselves. As a rule the "salutary" principle is fragrant; the "noxious" principle tainted and offensive. The odour may be most readily perceived in the hair of the head, and is more defined in the adult than in the child. Of course pomade or hair oil would interfere with the genuine scent.

If the subject of the test be in a cheerful, pleasant mood,

in good humour, the scent will be agreeable and sweet; but if sorrowful, depressed, in pain, or unwell, the scent will be disagreeable. This is particularly noticeable when persons are in the anguish of fever, so much so that the odour is perceptible immediately on entering the patient's room. Terror, or with children the fear of punishment, will elicit a very disagreeable odour, which has led many a teacher or father when chastising a child to form an erroneous conclusion, although terror and dread do also affect the bowels. The offensive odour, however, exhales from skin, mouth, and nose, and, as I have proved by experiments, directly from the brain as well. If a portion of brain substance be pulverised in a mortar, and a few drops of nitric acid be added, exactly the same odour is obtained.

I emphatically remark that I am here speaking of things which the experience of many of my readers will confirm, and all can very easily convince themselves of the correctness of these assertions, which have a great practical importance, especially in connection with my recommendations on health-culture. At present I will only add that whether the "salutary" or the "noxious" principle shall be released will depend upon the force of the excitatory influence which has caused the decomposition of albumen in the tissues. This may be very clearly demonstrated with the white of a hen's egg. If boiled with one of the weaker acids (or even nitric acid) it will emit a flavour of chicken broth; but if, for the purpose of decomposition, some strong agent like phosphoric acid be employed, the offensive odour of the excrement of poultry will be given off. Similarly, if the sensations are agreeable in their nature, they must be of *overpowering* intensity to liberate essence in the form of the "noxious" principle; while if the sensation be of an unpleasant kind, although much less intense, the

essence will no longer emanate in the form of the "salutary," but in that of the "noxious" principle.

Before I proceed to deal with practical deductions, it will be necessary to explain the important bearing of these principles upon the health of the body. We know from every-day experience that sickness and depression, and conversely, health and cheerfulness, usually go hand in hand. Upon closer observation, there is found to be a very intimate connection, and it is especially worth while to study the relation of the "noxious" principle to disease.

Physicians have long been aware that great terror, great dread, will, without the concurrence of any other cause, avail to bring about the most serious derangements of health, even sudden death. Also, that illness is attended with much greater risk, when associated with worry, grief, or depression; while it will augur well for the issue if the patient be relieved from apprehension, and a state of cheerful confidence, or, at any rate, of composure be established. Further, that terror, dread, grief, and care materially lessen the power of resisting certain disorders, foremost among which are the epidemic diseases, such as the plague, cholera, dysentery, and small-pox. Of cholera, for instance, it is known that a man thrown into a state of intense dread at sight of the dead body of a cholera patient will almost certainly sicken, and often with such speed that within a few hours he may be in sound health and die. Similarly, in time of war, armies beaten and pursued present a far more favourable field for the ravages of epidemic disease than their pursuers, flushed with victory, even though the defeated and the conquerors have occupied the same camping grounds in succession.

For all such phenomena there has hitherto been no satisfactory explanation; they have been ascribed to nervous agencies, entirely overlooking the real cause—a peculiar

volatile essence, the "noxious" principle, which permeates all the bodily juices and affects them in the manner of a poison. That some such influence must be in operation might have been inferred from the fact of hair turning white as a consequence of dread, grief, or care; this has been known to take place in a single night, when persons have been exposed to great dread or sorrow. Here the nervous system cannot be the agent, for the nerves do not reach into the hairs.

My researches make these phenomena clearly intelligible. The volatile "noxious" principle, when released from the brain, enters the blood, whereby it is circulated to every part of the body, working upon each particle of living substance as a paralysing poison. Any reader who has once experienced it knows how terror and dread affect the organs which are moved and controlled by the will. The limbs refuse to act, the voice is choked in the throat, everything is loosened and relaxed. However, the trouble does not end there, for the other organs present similar phenomena. The sensory nervous system is disabled. In the alimentary canal the paralysing action occasions an exudation of water, as attested by watery evacuations. Other signs are, outbreaks of perspiration upon the epidermis, and augmented renal excretion.

As regards epidemics, if an infectious disease prevail in any place, and the germs of it be disseminated in the air and drinking water, there must be numbers of people into whose system they will gain admittance through the vehicles of food and drink, without necessarily inducing sickness. Sickness will only be developed when the condition of the body is favourable to the germs.

Such a condition requires, firstly, that the bodily juices shall contain a certain percentage of water, for if it be insufficient the infection cannot take effect. This is the

reason why the process of hardening (water elimination) protects the body from infection. Secondly, the degree of vital energy in the tissues, especially in those of the walls of the intestines, which are first attacked by the disease germs, is an important factor. It will readily be understood that if the emotion of dread will set free within the body a noxious element, having power, as shown above, to paralyse all the living tissues, including the walls of the intestines, the same cause would suddenly annihilate the body's faculty of withstanding the influence of infection.

In describing the third condition—hitherto partly unrecognised—under which infection may be spread by epidemics, I am compelled to refer to things somewhat unsavoury. This is unavoidable, however, when writing on the question of health-culture; for the source of many diseases will be found to lie in dirt and things unsavoury, as to which an accurate knowledge is necessary if the diseases are to be guarded against.

Physicians have long been aware, and so in part has the general public, that the effluvia emanating from water closets and privies are dangerous to health, and that people who inhale such effluvia are very liable to catch infectious diseases. Hence, at the outbreak of an epidemic, it has latterly been customary to make a thorough examination of these places, and to get them disinfected. But a want of correct apprehension of the question has caused people to go astray in their measures of precaution.

For instance, it is generally supposed, since infection has been known to proceed from living organisms, that the offensive effluvia of water-closets and privies are not in themselves dangerous, and become so only when they contain these germs. That is an error. The mere inhaling of such effluvia will not produce cholera, typhus,

or dysentery; but if with the breath the effluvia enter the bodily juices, and thus pervade the entire system, their action will be identical with that of the mal-odorous "noxious" principle. Liability to infection is thereby increased, and all that is needed for infection to ensue is that the living organisms, however originating, should make their way into the body with the air, food, or drink, which during the prevalence of epidemics, may very easily occur. These germs might not have worked harm had not the way for them been prepared by inhaling the effluvia. The reason I will give presently, but I must explain one other circumstance which has hitherto remained unnoticed.

The alimentary canal of the body is the original source of the effluvia in question, and everyone is acquainted with their potent influence when they reach a certain degree of concentration in the body; the faculties of mind and body are disabled and lamed until relief is afforded by the removal or dissipation of these effluvia, when the reaction from their influence is felt as a positive exhilaration. Being extremely volatile, these emanations, while yet in the body, penetrate from the intestines into the bodily juices—a fact shown in every *post-mortem* examination—and thence they issue by means of the cutaneous evaporation. Their effect on the bodily juices in reference to epidemics is the same as if they had been inhaled, and as that of the mal-odorous "noxious" principle.

The essence of the foregoing statements is, that between the effluvia engendered within the body and the seeds of infection there is a relation, which I will now endeavour to explain.

Notwithstanding that each animal and plant carries within itself every element that appertains to the nutrition of any living being, yet each individual will feed upon a

special kind of nutriment, and in some cases only upon a particular plant or animal. This peculiarly applies to parasites; for instance, a dog flea might find in the human blood whatever is required for its nutriment, but has no relish for it; in fact, all vermin and parasites have their peculiar tastes, and where these cannot be indulged they will not settle or thrive.

The same thing applies to the germs of infection. They are parasites which in two respects have their special tastes. They settle only upon one or a few kinds of animals. The cholera germs thrive upon man; but they are attracted only by the mal-odorous "noxious" elements of the body, while the contrary fragrant "salutary" elements are not to their taste.

The reader will readily understand the deduction to be drawn. Within the body are continually generated two odorous essences, of opposite character—the fragrant "salutary" principle, and the offensive "noxious" principle —to which latter also belong the excretory effluvia. Accordingly as the latter or the former principle prevails, the liability to infection is greater or less. This throws considerable light upon the method which should be adopted of coping with epidemics.

From the foregoing the reader will have realised to some extent the great practical importance of being able to control the volatile essences above mentioned. I will endeavour to make this plainer. The sanitary aspect of the question may be stated thus:—The smaller the amount of the mal-odorous essences contained in the bodily juices—in other words, the lower the proportion of the "noxious" principle within the body—the greater will be the capacity of resisting infection I shall show, in Chap. 7, how this capacity is affected by the quantity of water in the tissues, and the matter may therefore be summed up as follows:

the lower the proportion of water in the tissues and of the "noxious" principle, the greater will be the security against disease. The question whether we have it in our power to procure this desirable condition of the body, I answer unhesitatingly in the affirmative, and I am able to state by what means. But I must first advert to the moral, as distinguished from the physical, aspect of the matter, for my experience shows it to be of high importance.

Before proceeding further, however, let me point out that I am not ventilating mere speculations, evolved from my inner consciousness while sitting before my desk. I am discussing facts, proved and tested upon myself and others.

Of the three moods engendered by the causes already described—equanimity; cheerfulness, or joy; and dread, grief, depression—the last named is induced by the presence of the same "noxious" principle which has been previously shown to imperil the health of the body.

Every increase of the "noxious" principle in the body—no matter how and whence arising—creates a sense of dread, apprehension, discomfort, and oppression, or induces that condition in which the impressions of things and events, which would otherwise be indifferent, become a source of annoyance. Whereas, conversely, the lower the proportion of the "noxious" principle within the body, the more cheerful and light-hearted is the mood, and the more perfect the equanimity. If anything arises to disturb the composure, the promptitude with which equanimity is restored will be according to the rapidity with which the elimination takes place of the "noxious" principle from the tissues.

IV.—THE BODY'S EXHALATION.—II.

UNDER this head are two propositions as to which scientific men are agreed.

1. The exhalation of the body comprises matters which deteriorate the atmosphere wherein we move, *i.e.* render it unwholesome, and which do so in a greater degree in proportion as they are more concentrated. In harmony with the tenet, Disease is Stench, these exhaled matters are either of themselves mal-odorous, or become so through even a moderate degree of concentration. The numerous attempts to ventilate and purify the air in living rooms are based on the recognition of this theory.

2. The repression of the skin's exhalation is injurious to health, and its stimulation is conducive to health. Inasmuch as the former phase involves enhanced concentration of the matters to be exhaled, while the latter implies their attenuation, this is in harmony with our theory that Disease is a form of concentration, while Health is allied to attenuation. From the recognition of this second proposition proceed all the hygienic endeavours in the direction of the treatment of the skin.

My hygienic teaching is in harmony with these generally accepted propositions as regards their common object. I, too, contend against that portion of the body's exhalation which vitiates the atmosphere; the only difference, as will be shown further on, is that I deal with the question more thoroughly. But first, I must add to our scientific knowledge respecting the body's exhalation, on a point which has been in a remarkable manner overlooked both by the official and the unorthodox professors of hygiene.

According to these gentlemen, whatever the body of a

human being, or of any animal exhales, is noxious and vitiates the air, while, as explained in the previous chapter, my investigations have established that the body's exhalation is composed of bad and good elements, a fact recognised in my Sanitary Woollen System, which combats the "noxious," injurious portion of the exhalation, and preserves and makes use of the "salutary" portion—*i.e.* the human Health-matter. Before we discuss the "how," we must consider the body's exhalation from another side—viz., the quantitative.

We have seen above that the health is enhanced or diminished according to the vigour with which the skin exhales, and we must now ascertain the conditions under which one or the other alternative takes place.

The chief consideration here is that *the skin exhales in proportion to the circulation in it of the blood; the more blood there is in the skin, the more the latter exhales.*

As the measure of the circulation of the blood in the skin is well known to vary very greatly, it is important to learn under what conditions it falls and rises.

1. The more actively we move our bodies, the greater will be the quantity of blood in the skin; hence the established fact that bodily exercise is healthy, and even a means of cure.

2. The skin acquires more blood when subjected to friction, and to this fact is due the wholesome effect of the so-called skin treatment, when properly applied.

3. Whatever warms the skin and keeps it warm enhances its circulation. Here, however, is revealed a great distinction between different portions of the surface of the skin; and as this distinction plays an important part in my directions as to clothing the body, it must be fully considered at this point.

When more blood is attracted to any portion of the skin,

by warming, friction, or other stimulant, the change will not be confined to that spot, but an antithetic effect will be induced, corresponding with the course of the main arteries. The reddening associated with a feeling of warmth proceeds, although in a lessened degree, from the spot which has been stimulated, along the chief blood vessels in the direction of the heart; for instance, if the spot be in the middle of the arm, it proceeds to the shoulder, as far as the skin receives its blood from the artery of the arm; and in the opposed direction the blood vessels of the skin contract. The skin of the arm anterior to the stimulated spot becomes paler, and there is a feeling of chill. This contrast is, of course, absent if the stimulant be applied to a place which is situated not in the middle of the course of a chief blood vessel, but at the point where the vessel terminates. These termini are found in the human body, (1) at the extremities—the fingers and toes; (2) along the front middle line of the chest and stomach, especially at the navel. All measures taken to strengthen the circulation of the blood at these points, affect not them alone, but also enhance the circulation *over the whole body*, with the single exception of the head, which being for the most part unclothed need not here be taken into consideration.

The principles of my Clothing Reform are based on a recognition of this law of the circulation of blood in the skin. The toes of the feet and the front middle line of the trunk, especially at the navel, should be especially protected, and if the circulation in the arm be not sufficiently maintained by manual exercise, care should be taken to keep the hands warm.

4. A final consideration in connection with the circulation of blood in the skin takes us back again to the odorous matters. It is easy to notice how, in everyday life, when a person enters a room where the atmosphere is bad, the face

pales, because the blood recedes from the skin. This is not only true of the skin on the face, but of that over the whole body, and is plainly perceptible through a certain feeling of chilliness. The effect is of course still more palpable if the scent of a mal-odorous object be directly inhaled. Fragrant odours have a converse influence. Inhalation of a fragrant object causes the skin to redden and induces a feeling of warmth. Odours, however, do not act on the circulation of blood in the skin through inhalation alone, but also directly on the skin itself. If a mal-odorous object, for instance, a dirty garment, be laid on the skin the latter becomes pale, and there is a feeling of chill; on the other hand, a fragrant object laid on the skin causes a feeling of warmth, and the skin is seen to redden. We have an undefined feeling that chill is prejudicial to us, and warmth beneficial, and yet no fact is more firmly established than that the temperature of the body's interior can only vary, consistently with health, in a very minute degree from a fixed degree of heat (98·4° Fahr.); every material departure, one way or the other, is associated with danger. Whence, therefore, arise this aversion to cold and predilection for warmth? Because it is not a question of the temperature of the *body's interior*, but of that of the *skin*. According to the temperature of the latter, the circulation rises and falls, and with it the skin's exhalation, which is the barometer of our being in good health. Whatever drives the blood from the skin causes a feeling of chill, diminishing the exhalation, and consequently prejudicing the health. Whatever attracts the blood to the skin causes a feeling of warmth, increasing the exhalation and the degree of health. Of course there may be an excessive attraction of blood to the skin through too much stimulation, as, for instance, through abuse of cold baths, &c. A deficiency of blood is thus caused internally, where it interferes with the conversion of matter.

From the foregoing it will be seen that there are two methods of testing the wholesomeness of an object:—1. The sense of smell. That which smells offensively is injurious, and that which smells agreeably is beneficial. Hence it may be said that the nose is the sentinel of the health. 2. The feeling of the skin. That which feels chilly is injurious, and that which feels warm is beneficial.

The last sentence brings us back again to the difference between animal and vegetable fibre. Wool feels warm; linen and cotton feel cold, even though the thermometer shows no difference in the temperature of these materials. The same difference exists between tanned and white or tawed leather, between wood and horn, between water and oil.

V.—THE VITIATION OF THE ATMOSPHERE.

IN speaking thus far only of the influence of exhaled matters on the surface of the skin, we have not exhausted the subject of the relation of these matters to the body—a relation which is of particular importance in the question under consideration.

In the previous chapter it has been demonstrated that we vitiate the atmosphere through our exhalation. That is to say, there is a double relation between the body and its exhalation; one is the surrender of the latter through the action of the skin and lungs, the other arises from the fact that the exhaled matters mingle with the air which we breathe; and the surrender is useless to us if we again breathe in the exhalation with the atmosphere. It is therefore desirable to know under what circumstances the proportion thus re-inhaled increases and diminishes, and here we have to consider the following:—

When the surface of the body is acting, as it should do, freely, it is in most cases warmer than the atmosphere surrounding it, which it consequently assists to heat and causes to ascend. Thus, in the still atmosphere of a closed room the body's exhalation moves in the direction of the breathing aperture. To a certain extent, it is not the air of the room which is breathed, but that of the clothing laden with exhalation, and the portion of the latter thus re-inhaled is of course equivalent to a diminution in the amount of exhalation thrown off. This breathing in of the body's exhalation can be only completely avoided in the open air, the motion of which carries off laterally or backwards the atmosphere of the clothes. We all know that we are healthiest in the open air, and that out-door occupations are, *ceteris paribus*, more healthy than those which confine us to rooms. The question is how the danger in the latter case of re-inhalation is to be reduced to the lowest point, and what connection exists between this question and our clothing, bedding, and furniture.

The most unfavourable condition of the day-clothing in this respect is when between it and the body a channel is left free which the air of the clothes can ascend unhindered to reach, in its full contentration, the breathing organs. Re-inhalation is greatly diminished when the clothing fits closely all over the body, compelling the exhalation to mingle at all points with the outer air, and thus to undergo a proportionate attenuation before mixing with the atmosphere breathed. Of course, in addition, the clothing must have two characteristics: it must be sufficiently porous to offer as little resistance as possible to the passage of the exhalation; and it must keep the skin warm, as this determines the volatility of the exhalation, and consequently its power to disperse in the atmosphere. It is of the first importance that the bed-

covering afford no impediment to the tendency of the warmed air to escape in an upward direction, as otherwise the air passes in full concentration from under the covering to the organs of breathing.

If what has been stated in the previous paragraph refers more particularly to technical directions as to clothings the following consideration brings us back to the question of choice of material, and to a comprehension of the injurious nature of wrong clothing materials. We saw above that the absorbing and giving out again of exhaled matters by clothing materials depend on temperature and degree of moisture. Under dry and cold conditions the vapours are taken up, and when warmth or moisture set in these vapours are exhaled again. The resulting mischief to persons who use materials of vegetable fibre for clothing and bedding may be illustrated thus :

1. A man sits with starched shirt-front, bending over his desk ; the starched shirt-front stands off from the body, becomes colder, and fills with noxious exhaled odours. When he rises and straightens himself the pressure of the shirt-front against the warm body causes the surplus exhalation absorbed to rise so that there is a concentrated re-inhalation ; while the woollen shirt-front would allow the noxious vapours to get away into the air. This is of course equally the case with every part of the clothing which alternately lies close to the skin, and is then again separated from it.

2. In the open air, in winter, the more the vegetable fibre parts of the clothing cool, the more they take up the noxious portions of the continuous exhalation of the body. On entering a warm room all these mischievous elements are set free, and vitiate the breathing atmosphere in a concentrated manner, so that through this alone a so-called attack of cold may ensue. It will readily be understood

that this phenomenon is more intense in proportion to the looseness of the clothing, and to the greater opportunity which it has to cool, so that also from this point of view closely fitting clothing is more advantageous.

3. On quitting the bed in the morning it is left warm. In proportion as it cools, the materials of vegetable fibre attract the noxious odours present in the atmosphere of the bed and the room, and the colder these materials become the more they absorb. Opening the window will then be useless, as these vapours are firmly anchored in the vegetable fibre. So soon as at night the warm body enters the bed, these vapours are set loose, and cause the icy feeling of a vegetable fibre bed in winter; for the first thing which these concentrated vapours from the vegetable fibre do, is to drive the blood away from the skin.

4. If two equally compact and thick pieces of stuff, one woollen and the other linen, be wetted, and hung up to dry, the linen will dry much more quickly than the wool. If, however, both pieces be applied to the living body, the converse takes place, and the wool dries much more quickly than the linen. The simple reason is, that the noxious odour from the linen drives away the blood from the skin, so that the latter becomes cold. Everyone knows the feeling of chill caused by a wet linen shirt. The odour of the woollen material on the other hand is salutary, attracting the blood to the skin, which becomes warm, and enables the moisture to evaporate more speedily. If the whole clothing consist of vegetable fibre, in the event of a complete wetting through rain or perspiration the skin becomes thoroughly chilled and bloodless, which is equivalent to a violent and sudden suppression of its exhalation, with a simultaneous rise in the internal temperature of the body, *i.e.* the interior becomes overheated, because the warmth finds no regular egress through the skin. In this lies the well known

danger of getting wet through in unsanitary clothing. In woollen clothing, on the other hand, getting wet through is free from danger, because the blood is not driven from the skin; the chilling effect of the evaporating moisture is completely warded off by the action of the salutary odour of the wool in extending the blood vessels, the process of exhalation is not interrupted, no internal over-heating takes place, and as the clothing dries quickly it is soon restored to its previous condition.

5. When we keep in closed rooms, we have to consider not only our clothing and bedding, but also all porous objects in the rooms which are liable to absorb the body's exhalation. Sanitary authorities recommend as much ventilation as possible, to maintain the purity of the atmosphere in rooms. In summer this presents no difficulty, but it is otherwise in the cold season. If the window be opened, a portion of the vitiated air will escape and be replaced by pure air, but at the same time all objects of vegetable material—the flooring, the furniture, the curtains, etc., as well as the earth and vegetable dust in the room—become cold and take up all evil odours which are present, and which continue absorbed in them, however long the window may remain open. So soon as the window is closed, and the room becomes warmer, these mischievous agents reappear, and the air is in a short time as bad as before. Everyone knows how unhealthy a wet flooring is, especially when it is not parquet flooring. But clearly the vapour of the water is not the dangerous element, otherwise a stay at a watering place, or near a waterfall, or a sail on a lake, would be much more hazardous still. The danger consists in the noxious odours which proceed from the wood when it is wetted, and these odours are nothing else than the noxious exhalations from the body which have been absorbed by the wood when in a dry condition.

The troubles connected with the maintenance of a pure atmosphere in our rooms disappear if all wood and vegetable fibre communicating with the atmosphere, in so far as they cannot be replaced with other material, be rendered, by polishing, oiling, varnishing, waxing, &c., incapable of acting as lurking places for "self-poison," whence the latter may break forth at every variation of temperature and of degree of moisture. Without these precautions, all our contrivances for ventilation are incomplete.

We have thus arrived at the following result. If we employ materials for our clothing, bedding, and furniture which in a cold and dry condition lay hold of our self-poison, *i.e.*, of the malodorous portions of the body's exhalation, and when warm and moist give it out again into the atmosphere, we are the defenceless victims of all variations of temperature and humidity; we have to deal with a foe which is at times concealed, but only to gather strength in the interval to attack us afresh.

If, however, we remove such materials, not only from our bodies, but also from our living, working, and sleeping rooms, and substitute for them such as are either indifferent in respect of the body's exhalations, as glass, metal, &c., or, better still, such as attract the body's inherent medicine, *i.e.*, the "salutary" exhalation, we enjoy two advantages:

1. Our self-poison will find no abiding place where it can collect; by the laws of gas expansion it will be attenuated in the atmosphere; it will be dispersed from our living rooms through all the openings and crevices which serve for ventilation; it will in the same way pass unimpeded from our clothing; we shall cease to be dependent on variations of warmth and humidity; we shall be *wind- and weather-proof.*

2. If we retain, by using proper materials in our clothes, our beds, and our rooms, the fragrant portion of the body's

exhalation, which may be termed the healing or vital power of our own nature, we diminish the quantity which the body surrenders, without depriving ourselves of its vivifying influence, and this we may consider as a conserving of a vital force. It also, to a certain extent, counteracts injurious influences not directly connected with the exhalation of our bodies, and sometimes unavoidable, chief among which may be mentioned the inhalation of impure air, such as in schools, in cities, and over whole stretches of country at the time that the fields are being manured.

VI.—CHILLS AND TENDENCY TO CHILLS.

THE three preceding chapters do not exhaust the natural history of the matters exhaled by the body. We have learned under what conditions these matters are given off, their relations to the objects capable of absorbing them, and the general fact that their imperfect elimination, *i.e.*, their concentration in the body and re-inhalation, endangers health. It is now, however, necessary to speak somewhat more in detail respecting the kinds and forms of this danger, a point on which there is partly a want of knowledge and partly misconception. If a layman be asked to indicate the origin of a disease, one of the commonest answers is that a chill has been contracted. A search through medical and hygienic literature as to the nature of chill reveals the astounding fact that the more modern the work the less it contains on this subject. Indeed, in the Encyclopœdia of collective Medical Science, just completed, in 15 vols., edited by Dr. ALBERT EULENBURG, in conjunction with more than a hundred medical professors and practitioners, an article on contracting chill is wholly wanting, a proof that our medical

knowledge moves in a direction which diverges from the goal at which it should certainly aim. Let us endeavour to supply the deficiency. The first question is, what does the layman mean by a chill? He means a feverish illness, of which the first symptom is a feeling of cold, a shivering of the skin. As the commencement of the indisposition frequently, although not always, coincides with the circumstance that the patient has been exposed to a more or less sharp variation of temperature, the layman combines the external objective with the internal subjective, *i.e.*, with his feeling of chill, and declares the former, *i.e.*, the variation of temperature, to be the actual cause. He traces his feeling of chill to the fall in the out-door temperature, which he regards as the cause of his illness. We shall soon see that this is not the true position of matters, and the recognition by the modern School of Medicine that this association of ideas is incorrect is evidently the cause of their omitting any definition of chill, which, however, is not the right course to pursue as a fact cannot be got rid of by ignoring it. The proper method is to substitute for the false explanation a correct one, and first the following should be pointed out :

If the variation of the out-door temperature were of itself sufficient to cause a chill to be contracted, all persons exposed to such variation would continually be subject to this complaint, which, as a matter of fact, is not the case. Some people catch cold on the slightest occasion, others never seem to do so. To infer from this that weather conditions do not influence chill-diseases would, of course, be a great mistake, for we cannot shut our eyes to the coincidence between many such attacks and the changes in the weather, nor to the frequently only individual cases of resistance to changes of temperature and degree of humidity.

The fact above mentioned merely shows that out-door

atmospheric incidents are not a cause of chill to all persons under all circumstances, but that to this end a second cause is absolutely necessary, a cause which lies within the person himself, namely, a so-called tendency to catch cold. Only when this is present can external conditions induce a chill, and they are powerless to do so when the tendency is absent. In medical practice it is of the greatest importance to know precisely in what this tendency to contract a chill consists, whence it comes, and how it may be removed. An answer to these questions is readily obtained if a person suffering from chill be examined with the chemical senses. We have seen in chapter I., that mal-odorous exhalation is an invariable sign of disease; to this may be added that the sense of smell can not only detect the presence of disease, but that the peculiar nature of the evil odour also permits a certain diagnosis respecting the nature of the matter which has induced the disease. On entering the room in which is a person who has contracted a chill, it will be patent to the dullest sense of smell that the air is vitiated to a much greater degree than it would be if the room were occupied by a healthy person with similar surroundings. The vitiation of the air, however, is akin to that which is also produced by healthy persons in an over-crowded room, and is especially suggestive of the odour of human evacuations and intestinal gases; there is a smell as if an imperfectly cleansed utensil were standing in the room. This alone must lead us to surmise that the disease-odour of a person suffering from chill is nothing else than an augmented accumulation of the noxious portion of the ordinary exhalation, and the question is, whence comes the sudden augmentation.

The above surmise is confirmed by the fact that persons are especially disposed to contract chill who live under conditions which hinder the regulated dispersion

from the skin and from the rooms which they inhabit, of the body's exhalation, *i.e*, persons who pursue sedentary occupations in closed rooms. On the other hand, those persons escape chills who live under circumstances which favour exhalation, *i.e.*, who have plenty of exercise, and are much in the open air.

A third hint is found in that which we have ascertained in the previous chapter respecting the physiological effect of evil odours on our sensations of temperature. We there saw that matters which are impregnated with the noxious portion of the body's exhalation cause a feeling of chill in the skin, and that therefore a characteristic effect of concentrated doses of self-poison is spasmodic action of the capillaries of the skin, with a feeling of chill; and we saw above that chill diseases commence with a feeling of chill exactly like that caused by a wet shirt of vegetable fibre material.

These three grounds taken together must of themselves, and because they are susceptible of no better explanation, compel us to admit that the cause of chill disease is to be ascribed to the mal-odorous portion of the body's exhalation. It remains to inquire why there should be so considerable an outbreak in the case of one person, and not in that of another; and here we must consider the natural history of the matters which the body exhales.

That everyone produces these matters, usually in a chief degree through the processes which go on in the intestinal canal, but partly also through the action of other organs, is certain. If a person be so situated that the body can exhale in a regular manner, the exhalation is freely given off, and the degree of concentration at any one time corresponds with the even relation between production and rendition. If, however, the conditions be unfavourable for exhalation, the effect is not confined to a simple

augmentation of the degree of its concentration in the humours of the body, which could always be diminished, but a portion of the exhalation is subjected to the same accumulative process which has long been established by physiologists in the case of oxygen, and which I will briefly describe.

The blood absorbs the oxygen from the air in the lungs, but the oxygen is so loosely combined with the blood that it can be withdrawn with little trouble, by means of an air-pump. This condition may be termed that of evidence or freedom, because it is one in which oxygen follows the laws of the expansion of vapour. When the blood enters the tissues, the latter withdraw from it the oxygen, which is then subject to two alternatives. If the tissues are in an active condition, the oxygen serves for the purpose of combustion; if the tissues are inactive, the oxygen becomes fixed in them, so that it no longer follows the laws of the expansion of vapour, and cannot, for instance, be extracted by the air-pump. This is the storing up of oxygen which takes place during sleep, and assumes so high a degree with hibernating animals that the loss of weight in other respects which they incur during their winter sleep is more than compensated by the oxygen stored up. In the same way is stored up the portion of the body's exhalation which I have called the self-poison, and under the same conditions, namely, when the tissues are inactive, the effect, of course, being enhanced, when, through insufficient throwing off of the exhalation, the degree of concentration of the *free* portion of the self-poison is higher. This is also the condition under which the tendency to chill is well known to be especially developed, *i.e.*, by keeping in closed rooms, and when the occupation is such as to maintain only a relatively small portion of the bodily tissue in activity, while the remainder is at rest. This is particularly

the case during sleep, when all is in repose, if the room be closed and the bed impregnated with self-poison. We are now in a position to trace with precision the difference between a person subject to chill and one who is weather-proof, and thereby to define the nature of the tendency to, and contracting of, chill.

As everyone produces self-poison, it is always present in the bodily juices; but, in the case of the weather-proof person it is only present in one form, viz., in that termed free, or evident, in which it obeys the laws of the expansion of vapour, and is thus under ordinary circumstances so attenuated that it corresponds with the "indifferent" degree.

In a person with tendency to chill, on the other hand, the self-poison is present in double form, one being the free form similar to that in the weather-proof person, and the other, of which the proportion is much greater, being in a fixed or stored-up form, and *this latter constitutes the tendency to contract a chill.*

We will now examine the part which the stored-up portion of the self-poison plays in the system; among its chief effects is that of enhancing the swelling capacity of the living tissue, and, consequently, the quantity of water which the latter contains. A tendency to chill may, therefore, be detected by the flabbiness of the flesh, and by the low specific weight of the entire body, while the flesh of a weather-proof person is hard. Lastly, we have to consider in what manner the stored-up self-poison produces the tendency to chill-disease.

This process of storing-up self-poison is as little a chemical combination as in the case of oxygen, otherwise it would be disposed of; it can be liberated from its confined stored-up condition and transferred to one of freedom, obeying the laws of expansion of vapour, and the question is, what are the impulses to this liberation? Three may be noted:

1. Rise of the temperature within the body, which may be brought about in two different ways—through increased production of heat due to greater activity of the organs, without corresponding increase in the amount of heat thrown off; or one of the commonest agents is the repulsion of the blood from the skin through some cause, checking the regular rendition of heat outwards, when internal overheating takes place, and the stored-up self-poison is set free. In this repulsion of the blood from the skin abrupt changes of temperature in the outer atmosphere play a great part; whether it be that on a hot day the temperature suddenly falls, or that a warm room is quickly exchanged for a cold one. But quite as frequently, or even oftener, the cause lies in the influence, as detailed in the previous chapter, of unsanitary clothing. The blood is suddenly driven from the skin when the linen underclothing becomes wet on the body; when a chilly part of the vegetable fibre clothing is pressed against the warm body; when the evil smell is encountered of a floor which has been wetted, or of a room which has been newly warmed; or, in winter, on entering a linen bed.

2. Increased activity of the organs. Just as repose of the organs favours the storing-up process, so is, conversely, their activity a liberating agent, even when the internal temperature of the body is not augmented; as, however, the latter is usually associated with the former, it is clear that without any variation in the atmospheric temperature, a person in an enervated condition may, through strained activity, contract an illness exactly resembling a chill.

3. Another agent in liberating the stored up self-poison is an enhanced attenuation of the free portion of the self-poison. This, again, is one of the agents whose connection with external conditions, with the so-called change of air, is apparent. When a person enervated by in-door life

goes into the open-air, especially if it be fresh and pure, such as rarefied mountain air, the portion of the self-poison which is subject to the laws of the expansion of vapour, enters on an energetic process of attenuation, and the vaporous expansion of the self-poison in the body is diminished to an important extent. This causes a sensation of relief and of feeling better; but the previous higher degree of expansion in a manner secured the stored-up self-poison from dispersion, which now ensues on the expansion being lowered, and the chill suddenly sets in.

To the last category belongs the so-called Woollen System crisis, to be discussed later on. Unsanitary clothing, especially when associated with an inactive mode of life, and with dwelling in an impure atmosphere, causes enervation and tendency to chill, *i.e.*, the storing up of self-poison, and increases the expansion of the free self-poison in the blood. If the unsanitary clothing and bedding be exchanged for Sanitary Woollen, the immediate effect of the consequent enhanced activity of the skin is an attenuation of the free portion of the self-poison, just as when a person accustomed to keep in-doors, makes an excursion in the open-air. The stored up self-poison is no longer securely held, it disperses, and the process of contracting a chill commences under circumstances which appear enigmatic to the person concerned. He has, perhaps, heard that woollen clothing is a good preventive of chill, and, indeed, this seems self-understood, for it keeps the body warm; perhaps he dons the clothing for the first time in very warm weather, and thinks that he cannot possibly take cold. All at once a thorough feverish shivering seizes him, just as he was supposing that he had for ever escaped from this danger; and yet nothing is more natural. Sanitary Woollen clothing can only protect from chill-diseases when the tendency to them has been removed; if, however, it

encounter the tendency, its first action is to drive the latter out, and the expelling process is, of course, a chill disease. We will conclude with a description of the course which a chill runs. At the moment of liberation of the stored-up self-poison two things happen: First, the mal-odorous portion of the body's exhalation is enhanced to a point which may be designated as offensive. Second, the patient becomes suddenly pale, because the dispersing self-poison induces spasmodic action of the blood vessels of the skin, causing the feeling of chill, which may range from a trivial shuddering to the strongest ague, according to the suddenness and intensity of the dispersion of the self-poison.

The further effects are as follows: With the repulsion of the blood from the skin to the interior of the body commences the well-known rise in the internal temperature, which, in spite of the external chilliness, causes a feeling of apprehension; and this condition lasts until the spasmodic action of the cutaneous blood vessels weakens, and the over heated blood in the interior returns to the skin, inducing, of course, a sensation of heat.

The heated state follows the chilly state. Relief is procured when the heated state is followed by an out-break of perspiration, for this latter is the means by which the surplus self-poison is brought out of the body to the surface; hence the old school of medicine termed this fever perspiration *critical.*

Thus in a short space we have obtained an insight into the nature, not only of chill, but also of fever, the nature of which latter is made as little clear in the literature of the modern school of medicine, as is that of chill and of disease in general.

VII.—EFFECTS OF EXCESS OF FAT AND WATER IN THE TISSUES.

THE English word "condition" is the only adequate term wherewith to express that state of mind and body in which the health and working power leave nothing to be desired. Let us first see what constitutes "condition." Briefly stated, it depends upon the correct proportion of the most important bodily constituents, and upon certain physical properties of the living tissues.

As regards a correct proportion of the bodily constituents, we may limit our inquiry to an examination as to three of these—albumen, fat, and water. The first is the foundation of muscle, nerve, blood, etc., and, in fact, sustains the existence of the body. Relatively to this substance, water and fat may be viewed simply as auxiliaries, although indispensable in themselves. A proper condition of the body requires that these three constituents shall be present in certain proportions, while the richer the body is in albumen the sounder it will be and the fitter for work; on the other hand, any excess of water or of fat will lessen its energies, and its power of repelling the action of influences likely to promote disease.

Touching the physical properties, we have first to consider the degree of excitability of the life conductors of the body, chief among which are the nerves and the muscles; for upon this quality depend energy, speed, and power of excitability in bodily and mental work, as well as in those processes of adjustment which sustain the body against external disturbing influences. The second point relates to the conditions of elasticity in the sinews, ligaments, vessels, lung tissues, etc. Any diminution in their flexibility and

firmness lessens the energy and the power of resistance of the body.

Imperfect action of the skin will induce, with varying rapidity, certain changes in the proportions of the constituents and in the physical properties of the substance of the body.

These changes must be considered separately.

Foremost I place the increase of the store of fat, which almost invariably supervenes in cases of sedentary habits of life, when there is no want of food. The injurious effects of an accumulation of fat are as follows :—

Careful experiments have established that fat people possess considerably less blood than the lean, and it is consequently a mistake to suppose that obese people are necessarily full-blooded. On the contrary, they are poor-blooded, which in itself is a malady made manifest by a never-ending series of minor disorders of the general economy ; and there are a variety of diseases to which fat people fall a prey and succumb much sooner than the lean, notably all those which are determined by the quantity of blood in the system. With reference to vital energy, it is notorious that persons suffering from poorness of blood are incapable of doing the same amount of work as those who possess a full measure of blood, because the working power of an organ depends upon the store of blood in it. Another drawback of obesity is that the fat diminishes the necessary space for the circulation of the blood and the play of the respiratory organs. The first of these evils brings about an abnormal distribution of the blood in the system, which is less apparent if the body be resting, but shows itself as soon as the circulation quickens, when the rapid flushing of the face indicates an excessive rush of blood to the head, which may produce dizziness or apoplexy. Another irregularity in the distribution of blood is

that its return from the lower parts of the body towards the heart is hindered by the reduction of the space in the abdominal cavity. This causes heaviness and lassitude in the legs, and a tendency to the formation of varicose veins ; while, if the circulation of blood in the system be impeded, there will ensue dropsical swelling of the legs. The obstruction to the return of the blood from the abdominal organs causes the extremely troublesome, and in their latter stages of development even dangerous, hemorrhoidal complaints which almost invariably afflict the obese. A hampered circulation is also one of the reasons why fat people are less capable of work than the lean. If an organ be required to do work, it needs 80 per cent. more blood than when at rest. Every labour therefore necessitates an alteration in the distribution of the blood, to which fat operates as a hindrance, blocking the ways so that the blood cannot flow in sufficient quantity to the part that requires it.

The limitation of space due to fat is also mischievous from its interference with the free play of the lungs. On this point I myself took measurements, which went to show that, among men of forty years of age, the obese could only empty a breathing measure to the extent of 18 cubic centimetres of air to every kilogramme of weight of body, after taking in the longest possible breath, while the lean would inhale 40 to 50 cubic centimetres, or about three times as much. It follows that the obese are disabled from exceptional exertion necessitating fuller breathing than usual and a more copious flow of blood through the lungs, which latter have not sufficient space either for the air or the blood. The obstruction caused by fat is shown in the rapidity with which an obese person becomes heated by exertion ; but even in repose this interference with the free play of the respiratory apparatus is injurious, and renders the body sluggish, because it checks the excretion and combustion

of the substances (carbonic acid, water, and lactic acid) which hinder the proper functional processes of the body.

With regard to the greater liability in cases of obesity to attacks of disease, I may particularly refer to the danger of pulmonary affections. If any such malady render one portion of the lungs unserviceable, life will be further shortened by the reduced working capacity of the remnant which may be still available for use. Fat people are also far more susceptible to such maladies as gout, dropsy, emphysemæ, etc.

The effect of fatty deposits upon the physical properties of the living tissues, and especially upon the measure of their activity, may be easily verified by experiments. If a nerve be severed in a living animal so that the brain can no longer transmit its action, and is thus reduced to a condition of rest, globules of fatty matter will be gradually deposited, and in proportion as this proceeds the active faculty of the brain will decrease. A similar change affects the muscles when their nerves have been cut. Their power of contraction and the energy of the contractions diminish in the same ratio as the granules of fat increase in number and size. Since, therefore, the measure of excitability in nerve and muscle governs the power and energy not only of bodily but also of mental work, it will be easily understood why corpulent persons become inert and limp both in body and mind. As regards the mind, I may add that fatty degeneration of the brain is one of the most frequent causes of imbecility and mental aberration.

From the foregoing it will be seen that anyone wishing to preserve health and working capacity, should keep strict watch whether any deposit of fat is going on in the body. Such symptoms must be taken as a *memento mori*, evidencing a wrong system of living, and in order to stay the further accumulation of fat and get rid of what is superfluous,

recourse must be had to increased action of the skin. There is no better remedy. Against the well-known BANTING cure, consisting in abstinence as much as possible from fatty or farinaceous food, I would caution all persons with whom the deposit of fat has attained any considerable proportions, because under such circumstances it may become dangerous ; and even though it bring no peril with it in particular cases, the efficacy of the BANTING cure is infinitely inferior to the agency of an active skin in the restoration of a healthy condition to mind and body.

An inordinate increase of the percentage of water is not so apparent as the deposit of fatty matter—if the two morbid conditions do not manifest themselves concurrently, which is mostly the case—but it makes itself distinctly felt ; the flesh is flabby, like dough ; whereas under normal conditions it should be perfectly elastic and firm. Accumulation of water in the system directly tends to increase the percentage of water in the blood, which means poorness of blood, and a consequent lowering of the powers in all parts of the body ; for their nutrition is lessened, and the water in them increases, crippling the vital forces, or, in other words, diminishing the normal activity of nerve and muscle, and eventually suspending it altogether.

The experiments of Professor NAEGELI have established that germs of fermentation and putrescence require a certain proportion of water in the solution or tissues in which they settle, in order to flourish and multiply. For instance, fermentation may be stopped by thickening the liquor, and meat may be preserved by desiccation.

By maintaining and assisting the activity of the skin, the water is drained from the body, reducing or thickening the mass of the bodily juices. In times of epidemics the firmer the tissues the greater will be the energy of the vital forces to withstand the attacks of disease-germs, which become

weakened in proportion as the degree of concentration of the bodily juices is raised. Hence, a comparatively small difference in the percentage of water in the tissues may decide the struggle of the latter against the germs of infection.

VIII.—INFECTION.

THE question of infection through so-called infectious diseases was alluded to at the close of the preceding chapter, but reference was there made to only one of the conditions of infection—viz., the proportion of water in the tissues and juices of the body. We have now to consider the other side of the question, the relation between the capacity for infection and the odorous matters in the body. During the cholera epidemic of 1884 a paragraph appeared in several of the daily papers respecting a fact already repeatedly noticed, that an emigration of birds takes place during cholera epidemics; in this case the crows and jackdaws deserted the nests which they had made in the cathedral at Ratzeburg. I remarked on this, that the famous old Berlin physician, HEIM, and thousands of physicians since his time, have shown that all infectious diseases, such as scarlet fever, measles, small-pox, may be recognised with certainty by the peculiar odour of the exhalation from the skin; and in the same way it is known that a specific odour is associated with the development of cholera, which is of course especially distinct in the case of the evacuations. According to the hand-books, the odour is of the nature of sperm, with something of a putrid character. It is therefore not to be wondered at that the animal world, which unfortunately has a finer sense of smell than our learned men possess, is acutely sensitive to cholera.

(I may remark, in passing, that similar information as to the exodus of birds has been published in connection with nearly every epidemic of cholera.)

Solomon says, "Go to the ant, thou sluggard; consider her ways and be wise." Students of medical science are too prone to learn from books, in lecture rooms and laboratories, and to neglect the great teacher Nature herself. They are acquainted with the natural sciences, but not with nature, whom they do not sufficiently observe. Microbes, Bacilli, Bacteria, are parasitical organisms; and whoever is not acquainted with the laws which govern the whole world of parasites, without exception—whether the parasite be animal or vegetable, and whether it attach itself to an animal or to a plant—is groping as in a fog, theoretically and practically, when a matter like the cholera is in question.

Medical men are certainly prescribed the study of botany and zoology, but these studies include everything but that which they will require in order to be armed for the struggle with parasites big and little. The laws respecting parasites can only be learned from observing nature herself, and by instituting comparisons which show the common action of all parasites. In my larger technical works I have dealt with the essential points of this subject, which are especially important in connection with epidemic disease; and, to enable my readers to form an opinion for themselves, I will here again briefly elucidate the question.

The first principal law of parasitical life is that of specific relation—*i.e.*, the fact that no parasite settles without choice on any organism whatever. Either it is only found on one particular animal or species of plant (frequently on one particular organ of such animal or plant), which may be termed its specific host, or, even in extreme cases, only on a relatively small number (having regard to the immense number of kinds of animals and plants); and a parasite

cannot be transferred from its natural specific host to any chance kind of animal or plant. A bird-louse never settles on a dog; nor a dog flea, nor lice which infest swine and cats, on a human being; lice which affect human beings do not affect dogs, and if a transfer be artificially made, it will be noticed that the parasite in most cases does not even attempt to bite the strange body, and that it is therefore the odour which prevents it from doing so: the same is true of parasitical fungi. If the potato fungus be placed on the leaves of another plant, under the most favourable conditions of growth, it will not germinate, and makes no attempt to penetrate with its filaments the pores of the leaf; and this is obviously due, not to difference in physical construction, but to something in the atmosphere of the leaf, in short, to its specific odour and taste. The fungus has, it is true, no nose, like an animal, but it has quite as fine a general chemical sense as the animal. Thus every parasite requires, in order to settle and thrive, a specific matter, which I term its adequate matter of appetite, inclination, or instinct. The whole of our epidemic diseases present a similar phenomenon of specific relation, especially cholera. All attempts to give cholera to various kinds of animals have failed: *the adequate matter of instinct of the cholera bacillus is solely the specific odour of human beings.* Therefore it is that this bacillus only thrives on human beings and in places where the specific human odour is present in the human evacuations, in the same way as the odour of our beasts of draught is present on a much frequented road.

The zoologist must needs smile at the assertion of VIRCHOW, that the bacillus is not the cause of cholera, and at the explanation of Professor DRASCHE, of Vienna, that it is the product of the disease. This is as though one should say that the alcoholic ferment is not the cause but the

product of fermentation. To the zoologist the fact that, in infectious diseases, there is a quite specific odour not otherwise found either with sick or healthy persons, is ample proof that here a specific extraneous organism is at work. The best voucher for this is the above described behaviour of the birds.

The second principal law of parasites, which in general is still less understood than the first by students of natural science, is the fact that three kinds of parasites are found on one and the same host:

1. Such as settle almost without selection on any individual of the particular species of host, if opportunity of contact occur. I will not dispute the existence of such parasites, but their number is exceedingly small compared with the two following kinds.

2. Health-parasites, as I term them, which only settle on their specific host when and so long as the latter is healthy, and which either depart altogether at time of disease or show signs of disturbance, coming to the surface and evincing by their behaviour that their host is distasteful to them. To this group belong, for instance, among parasites of plants, nearly all caterpillars which feed on leaves, and which, as every breeder of caterpillars knows, at once reject leaves when the latter become withered. Further, among the larger parasites of animals, the lice which infest the hair and feathers of all mammals and birds; and among the larger parasites of human beings the head-louse, which is only at ease on the heads of healthy young people; while, although circumstances may compel it to attach itself to sickly children, it then never thrives, and seizes every opportunity to remove to a healthy person. Another health-parasite of human beings is the tapeworm, a fact well-known in Abyssinia, where, in consequence of the general practice of eating raw meat, everyone has frequent

opportunity of acquiring this parasite; indeed, no one is without it, excepting only the sickly and weak, so that persons without tapeworm are objects of pity; and if such an one subsequently acquire the parasite, his friends congratulate him as though it were a family event. A further proof is afforded by some (not all) of the methods of expelling tapeworm. This is at times effected by setting up a feeling of the worst nausea, in short by making the person ill, in consequence of which the tapeworm departs.

3. Disease-parasites are such as do not settle on their host when the latter is in a healthy condition, even when brought into contact with the host, but show signs of activity when the general condition of the host is disturbed by fatigue, mental worry, or actual illness. This can, of course, be best observed in the case of the larger parasites of the insect class. For instance, in contrast to the leaf-caterpillars, which at once desert a tree when it is felled and its leaves wither, there is a set of bark-beetles which the collector seeks for in vain on healthy trees, and which first appear on trees when the latter are either felled or are suffering from effects of storm, snow, or lightning, or from attacks of caterpillars; and everyone can easily ascertain for himself that the odour of the bark of such a weakly tree differs as much from its odour in a healthy state as does that of a withered nosegay from a fresh one, or of hay from grass. Those who are practised in forestry are also well aware that it is this smell which attracts the bark-beetle, and that artificially injuring a tree suffices to draw these insects to it from a considerable distance. The practical gardener and grower of fruit trees is equally acquainted with the fact that numerous kinds of plant-lice only settle and get the upper-hand when the taste and smell of the plant have altered, in consequence of the sap ceasing to flow.

Among the insect parasites of human beings may be

named the louse, which is associated with phthisis, and especially the genuine house-fly, which is particularly instructive on the question of cholera, in that both house-fly and cholera bacillus rely not on human beings alone for their nourishment and existence, but can maintain themselves independently in places where only human excretions—with the specific human odour—are within their reach. There is certainly the difference between the house-fly and the cholera germ that the former has the power of voluntary motion and is attracted from a distance by an odour, while the latter is spread and transported to its host in a passive manner by other agencies. This difference, however, in no way affects the question that cholera germs and house-flies settle on the same fostering soil. Naturally a person remains free from cholera when the germs are not conveyed to him in his food, drink, or air, just as he will not have a fly settle on his nose if no fly be in the room. But when a cholera germ has entered his body, the question arises whether he will constrain it, *i.e.*, by digesting it, hinder it from germinating, and eject it in the natural way free from result, or whether the germ will gain the upper hand, multiply, spread, and set the bodily juices in the specific state of fermentation. It is undeniable that even in the most raging epidemic by no means everyone is attacked by cholera, and those who catch it exhibit all stages of the disease from the mildest diarrhœa to the most sudden death; and yet withal it is impossible to assume that the nurses in a cholera hospital who remain healthy, or, indeed, any person whatever in a town attacked by cholera, have not a dozen times unconsciously swallowed cholera bacilli. The bacillus certainly engenders cholera, although not in every instance where it enters the body, but only in such cases as are *disposed to infection*; and the question which is naturally and practically decisive is that

of the nature of this tendency. What do the medical handbooks state on this subject? I open one of the latest, the Encyclopedia of Medical Knowledge, by Dr. ALBERT EULENBURG, appointed professor of the University of Greifswald, assisted by 101 professors and physicians. There I find, vol. 3, page 241: "Persons who are easily "subject to catarrh of stomach and bowels, or have made free "use of aperients, or have neglected an accidental attack of "diarrhœa, are particularly disposed to sicken with cholera. "Persons who are weakened by long confinement to "a sick bed incur especial danger, and other diseases "afford no immunity against cholera. Pregnant women "are particularly liable to be attacked by cholera, usually "with fatal results, which are preceded by premature "delivery. But mental excitement is of unmistakeable influ-"ence, and exaggerated dread of infection appears to be "particularly fatal in its effect." (The article is by Professor Dr. EICHHORST, of Göttingen).

To this I say, as a professed zoologist, the persons who are worried by house-flies are precisely those who are under the influence of terror, or are otherwise mentally disturbed, or who are suffering with diarrhœa, or who are otherwise ill and weakly, or who are subject to the frequent interruptions to health due to pregnancy. A wholly sound, healthy person is not annoyed by the flies on the wall, because they do not settle on him; but so soon as his exhalation assumes a mal-odorous, fœcal character, the flies are attracted by it. This is further confirmed by the experience in all cholera epidemics that uncleanliness in dwellings and streets greatly promotes the outbreak and spread of cholera, and a bad smell is everywhere considered a sign of uncleanliness and of unclean places: now every child knows that these are also the places where flies swarm. A popular medical journal states:—

"The best disinfectant against cholera is, according to Professor BIERMER, fresh air. Wherever windows and doors are diligently kept open, exemption from the pest is to a certain extent guaranteed." Well, this is known to be also the best means of making rooms unattractive to flies. Thus the adequate instinct matter for flies and for the cholera bacillus is the offensive smell of human beings. To the question where bacilli and bacteria all live may be answered, wholly in mal-odorous fluids. They are stench-loving (the Greek word is "bromophil") parasites, which are transmitted everywhere by the motion of wind and water, but only multiply and induce fermentation where there is stench. For instance, it has long been known to popular tradition, and to those who are concerned with fermenting processes (brewers, owners of wine cellars, &c.), that if the offensive odour which characterises the catamenia penetrates to the fermenting fluids, it causes false, *i.e.* bacterial, fermentation. One thing more. As long as I taught the use of the microscope, one of the first objects that I gave to a pupil to study was some scraping from his own tongue, where may be seen numerous little parasitical organisms of various kinds, and among them thousands of bacilli. These are impotent so long as a person is healthy; but so soon as he sickens, and thereby becomes mal-odorous, the whole company begins to multiply in a lively manner, forming the furred tongue so characteristic of a sick person; and at the same time the flies make their appearance on the scene.

The conclusion which I draw as regards my Sanitary Woollen System is as follows:—Whoever, like the Wool-wearer, is proof against flies is also cholera-proof, and this is in complete agreement with the popular practice everywhere and at all times to have recourse to wool in cases of cholera.

Those who know my Sanitary Woollen System, and have tried it on their own persons, are aware that it first deodorises the body, *i.e.*, expels from it mal-odorous perspiration, and afterwards hinders a fresh accumulation of mal-odorous matters. Now, these last are precisely the matters which constitute the force of attraction for flies, and the adequate instinct matter for the germs of disease, especially for those of cholera. Only such Wool-wearers, therefore, as are constrained to be much in offices, schools, and other close places, and whose colleagues object to open windows "lest a cholera bacillus float in," need be on their guard when the cholera comes. The Wool-wearer, on the other hand, who has unlimited enjoyment of fresh air may be quite at ease.

The above statements respecting cholera apply to all diseases of which the specific symptoms of disease are occasioned by bacteria. This is no mere theoretical inference, but the result of a mass of experience which is now available respecting the operation of the Sanitary Woollen System : it has proved its protective power against all so-called infectious diseases, a power, however, not of course in an absolute sense, for even the strictest carrying out of the Sanitary Woollen System cannot wholly protect in every situation from impregnation with noxious human odour—*i.e.*, with the self-poison described in a previous chapter.

But the following has been placed beyond dispute :—

1. Wool-wearers amidst epidemics remain exempt in a remarkable degree. In 1883 there was a rather severe epidemic of typhus in Zurich, and both friends and foes of the Sanitary Woollen System took careful note whether Wool-wearers sickened. Although the number of the latter in Zurich is very considerable, only one case of typhus was observed among them, and that was a female telegraph

clerk whose work compelled her to sit in a place deprived of all means of ventilation, so that the storing up of self-poison was inevitable.

2. If, however, Wool-wearers be attacked with infectious diseases, the cure is nearly always accomplished without the common subsequent ailments, and so rapidly as to puzzle the doctor who is treating the case; and if the reactionary symptoms are occasionally of a stormy character, they are so in a mild form, without dangerous complications. This has been confirmed with regard to typhus (in the above case recovery was complete in four weeks), diphtheria, scarlet fever, measles. No instances of small-pox and cholera have been specially noted in the case of Wool-wearers, but the value of wool for the prevention and cure of these diseases has been well observed, and as regards cholera is matter of folk-lore.

3. The cases in which Wool-wearers have been attacked with infectious diseases are a striking proof of the correctness of my doctrine of infection; for they have always been, as in the above case of typhus, persons constrained to remain for long periods in crowded, badly ventilated rooms, dens of self-poison, as are too many of our schools and large offices.

A fact alluded to above, which has been a thousand times confirmed, and affords another brilliant corroboration of my views as to parasites, is that Wool-wearers are almost wholly exempt, not only from the parasitical germs of disease, but also from the larger parasitical tormenters, house-flies, fleas, and bugs. This is most striking in the case of the ubiquitous flea: it absolutely emigrates from whole families of Wool-wearers. The adequate instinct-matter required by the flea to accompany the taste of human blood is the taste (or smell) of urine. This taste (or odour) clings to clothing of vegetable fibre, but woollen clothing, as everyone can

easily ascertain for himself, is entirely free from it. I hope that I shall not be so misunderstood here as I once was by an assistant physician at a University, on the occasion of a discussion on this subject which took place in a small circle of acquaintances after my delivery of a lecture on the Sanitary Woollen System. He retorted on me that if fleas are fond of this taste, why do they not satisfy it directly from the deposited fluid? I pointed out, in reply, that while most people prefer that a soup be seasoned with salt, they do not empty the salt cellar into it. The flea relishes blood which must have the said accompanying taste.

If we compare what has been stated in the present chapter about infection with what we learned in a previous chapter respecting the nature of a chill, we arrive at the conviction that the tendency both to chill and to infection may be referred to the same condition—namely, to the presence of stored-up self-poison. First, the storing-up, as already explained, causes an increase of water in the tissues, which indicates enhanced capacity of fermentation through bacilli; second, the disengaged portion of self-poison, which is always present in a concentrated condition side by side with the stored-up portion, forms a sufficiently animating stimulus for the infectious germ to fructify, and thereby to induce fermentation. So soon as this begins, the self-poison which supplies the germ with ample material of subsistence commences to disperse in the body. Hence most infectious diseases commence exactly like chill diseases, with fever, and we may shortly sum the matter up thus: Stored-up self-poison disposes to feverish sickening of every kind, and the odour of fever is the liberated self-poison unassociated with any other odour in the case of chill diseases, but combined, in the case of infectious diseases, with the specific odour of the germ of infection.

IX.—NERVE MEASUREMENT.

IN my technical works I have explained at length that there are methods of ascertaining and denoting in figures the bodily conditions which may be termed those of general feeling—*i.e.*, we are pleased or displeased; we feel desire or aversion; we are attracted or repelled. These general feelings are connected with changes in the rapidity and regularity of the vital movements, which can be ascertained by means of instruments that register them.

For investigations of this kind a chronoscope is used, the index-hand of which, by simple pressure exerted upon two separate knobs, can either be brought to a standstill or again re-connected with the clock-work, which continues to run; and the stop-watch is so constructed as to record the two-thousandth part of a second. The operator holds the knob that sets the index-hand in motion, while upon the stoppage-knob rests the finger of the person undergoing the test. At the commencement of the trial the index-hand stands still, and its position is noted. Immediately the operator starts the index-hand, by pressing the knob under his control, the other person must arrest it by pressing the second knob. The difference between the two readings or positions of the index will then accurately indicate, on a scale of one two-thousandth part of a second, the time needed by the above excitation to run its course through the eye, the optic nerves, the brain, the nerves of the arm, and finally reach the muscles actuating the finger that presses against the knob. In another experiment the stop-watch was connected with an electric bell, which intimated to the subject of the test the starting of the

index-hand. This gave the time of transmission of the nervous impulse from the ear to the finger. Thirdly, to test the activity of the brain, two bells were connected with the clock-work, one on the right hand and the other on the left of the subject of the test, in each of whose hands was placed a knob to stop the index with. The operator held in his grasp two other knobs, enabling him to ring the bell on either side at will, when the index-hand was set going. The subject of the test was required to press the knobs right or left, accordingly as the bell rang right or left. The intervals of time, as ascertained in this last trial, were constantly longer than those recorded in the second experiment, when only one bell had been used; and the deduction of the interval of time involved in the second experiment from that required in the third experiment will give the duration of the psychical operation upon which depends the act of discrimination between right and left. A few trials by this simple method of the Nerve-time, under the varying conditions of the general feelings described above, will soon show that it changes with extraordinary promptitude according to the nature of these feelings. A single measurement will not suffice; several must be taken, and the average of the whole will give the result. Four averages, each of ten measurements, are sufficiently precise for most purposes, but this can be doubled, if desired; and thousand-fold measurements taken over a series of years have established the following important facts:—If a person be under the influence of pleasurable emotions through the senses of sight, hearing, smell, or through appetite, joy, &c., his average Nerve-time will be shorter; while if the emotions be displeasing, it will be prolonged. The reader will doubtless remember from his own every-day experience that when people are cheerful they speak, walk, and work

more rapidly, in short, that all voluntary movements are quicker than when the emotions are placid; while when a person is depressed from any cause these movements are slower. The practical application of these facts to objects which bear upon the health will readily be comprehended by those who have studied what I have stated elsewhere in this book on the importance of using our chemical senses. I have explained that animals are able to distinguish between what is and is not suitable to their health, by inhaling the odour of objects; and man is endowed with the same faculty, although it has to some extent been overpowered by the exercise of what are called the reasoning faculties, which too often fail him in such matters as a guide, or even mislead him altogether.

The average Nerve-time having previously been ascertained in the manner described above, the odour of the object to be tested is inhaled for a period varying from one to three minutes, when the Nerve-measurement is again taken, and the shortening or prolongation of the time will determine whether the nature of the object is conducive to health or the reverse. If the Nerve-time is shortened, the object exercises an influence which I term "animating," while a prolongation of the Nerve-time indicates a "laming" influence in a greater or less degree. A moderate amount of practice, under proper conditions, will soon give results which establish an astounding accuracy in the response of the rate of rapidity of action of the nerves and muscles to the degree of wholesomeness which characterises the most various objects. The conditions referred to mainly consist in the exclusion, as far as possible, of all external influences. For instance, the testing should take place at a period between meals, when the tester is neither satiated nor hungry. Odours of cooking, &c., should be excluded by means of closed doors and windows,

and even by deodorising the room with ozogen (see chap. 44). The tester should be in a normal state of health, and free from emotional influences.

Idiosyncratic preferences and objections must, of course, be allowed for in such tests. Persons, for instance, who object to the taste of milk, would obtain a nerve-measurement indicative of "laming" influence from the finest sample of milk. But here again the *comparative* results would be true, *i.e.*, a worse sample of milk would give a longer Nerve-time than would result from a better sample.

Like most innovations, the method here briefly described, but which will be found fully set forth and discussed in my technical works, has been freely denounced as nonsense, and as worthless for physiological research. People who adopt this line of argument, instead of making careful trial before uttering a condemnation which otherwise can carry no weight, are probably ignorant that Nerve-measurement has long been familiar to an eminently practical and learned body of men. Astronomers have learned by experience that different persons, even when employing the same amount of care and force of will, are not equally prompt in executing a voluntary movement, for instance, the notation of the transit of a star; in each case there is a certain retardation, and the extent of retardation not only varies with different persons, but also, under certain circumstances, with the individual. By help of the finest and most ingenious of chronometers, the chronoscope of Hipp, astronomers have for many years been careful to measure the duration of this varying individual retardation, by observing the period required for an impulse to reach the brain, and cause voluntary action; the resulting figures are termed the "personal equalisation," and enter into astronomical calculations.

Here is only one alternative: either the astronomers

are deceived, or if the individual difference and the variation of the extent of retardation can really be measured, then this method of measurement must also be applicable as a test of the causes which produce these differences and variations.

PART II.—CURATIVE.

X.—THE CURE OF DISEASE.

PROBABLY in no field of human activity arise such embittered differences of opinion as in that of Healing, and medical theory and practice as continually change as the fashions of female dress. One reason for this is, that the science of Medicine has lost itself in the casuistry of the endless variety of consequences of diseases, instead of pursuing the essential cause which underlies every disease. Another reason is found in the subject itself, as will appear from this and the succeeding chapters. Our first endeavour must be to clearly understand the nature of the Process of Cure.

We have seen in chapter I. that a material element, a disease-matter, is the foundation of disease; and that a disease-matter is characterized in the first place, not by its quality but by its quantity. Every conceivable matter in the body becomes disease-matter so soon as it appears in excess, or, in other words, in too high a degree of concentration; and every matter, even the most virulent poison, becomes harmless when sufficiently attenuated. Thus the problem of Healing simply resolves itself into the attenuation of disease-matter. The expression Expulsion or Excretion, which is frequently associated with the healing problem, does not precisely hit the mark, but rather applies to a special case.

We learned, in chapter VI., to recognize two relations between the body and its self-poison: the free state of the latter, in which its degree of concentration depends solely

on the conditions of its vaporous expansion in the atmosphere where it is present; and the stored-up state, in which, while not wholly independent of the factor of vaporous expansion, it is yet in so far independent as that its degree of concentration does not promptly follow every change in the vaporous expansion of the outer atmosphere, but requires a liberating impulse to cause an important alteration. Now the word Expulsion especially applies to this second stored-up state, but is quantitatively still somewhat wide of the mark, inasmuch as the question is not one of a complete removal, to the last atom, but only to an innocuous point, or as the technical phrase goes, to an indifferent degree of quantity or concentration. For these reasons it is better to adhere to the conception of the attenuating treatment, and to employ the term Expulsion for special cases. If a latinised word be desired, "Disconcentration" seems most suitable, although this combination is open to philological objections.

I must, however, before I proceed to describe the attenuating process, add a technical supplement to what I have previously stated. Reference has only been made to one kind of disease-matter, namely, self-poison; it should be added that all that has been stated in earlier chapters with regard to self-poison applies as well to extraneous poisons, which can also be present in the body in a free or in a stored-up state; in the former case the result is a so-called acute, or recent, poisoning, and in the latter the state is termed chronic—Cachexy, or Dyscrasia, as, for instance, a Quicksilver Dyscrasia. If there be a difference between the action of self-poison and of extraneous poisons, it is that the latter, as, for instance, the metallic poisons, combine more firmly with the living tissues, and are therefore more difficult to expel than the stored-up self-poison, which is comparatively easy to set in motion.

To return to our subject matter, if the solution of the healing problem consists in attenuating, expelling, it is clear that various ways may be taken to this end, and that therefore different methods of cure are possible and effective; it is equally clear that a whole series of diseases cure themselves without any special treatment. Let us take, for instance, the simplest case. If someone in a theatre, concert-hall, or other overcrowded room, is taken ill, owing to the effect of concentrated human odour, it suffices that such person be brought out into the fresh air where the vaporous expansion of this odour is practically nil, compared with the air in the room. Attenuation of the disease-matter at once begins, and recovery sets in so soon as the indifferent degree of concentration is reached. Precisely in the same way, when anyone poisoned with carbonic acid, in a place where fermentation is proceeding, or with sewer gas, in a sewer, is brought in good time to the open air, the poisoning disappears of itself.

The case is different when the disease-matter is present in a stored-up form, or when, as happens with carbon-monoxide gas, the poison has at once entered into more or less firm chemical combination with vitally important parts of the tissues. In this case removal to the open air will not alone suffice to bring about an immediate cure, but here also *the first condition of a quick and successful cure is the removal of the patient to the fresh air.* Under any circumstances this must cause the attenuation of the portion of the poison which is still at liberty, and the removal to the fresh air may even be sufficient to compel the stored-up portion to be excreted, as the following consideration will show. The powerful attraction between the molecules of matter, compelling each molecule to follow the other, of course also subsists between the free and the stored-up molecules; and when the free portion of the

poison is subjected, by removal of the patient to the fresh air, to the attenuating or distancing process, the force which retains the stored-up molecules is opposed by the molecular attraction of the free molecules in course of attenuation. It then becomes a question which of these two forces will gain the victory; and there are and must be cases enough in which the molecular attraction conquers, as is indeed confirmed by the fact that in many chronic cases of disease, which always imply stored-up disease-matter, a simple change to mountain, or merely country, air, suffices, if not at once, then gradually, to procure a remedial effect. But even in the most unfavourable case, when the molecular attraction alone does not vanquish the storing-up force, the former exercises on the latter a weakening influence, facilitating the action of other means of expulsion which may be adopted. Thus the removal to fresh air remains the first condition of a prompt cure.

To the two instances already mentioned of self-cure through removal to the fresh air, a third should be added. Numerous cases of infectious diseases, Typhus, Cholera, &c. are known to recover without any proper artificial treatment; and if I am not mistaken, it was Professor NUSSBAUM, or some other superintending army physician, who, in one of the recent campaigns, remarked that it was much better for a typhus patient to lie in the street than in a hospital. How is it that these forms of disease also cure themselves? The reasons are two.

1. In the chapter on "Infection" we saw that the disease-germs only settle in a body which, in consequence of the storing up of self-poison and of water, is disposed thereto. Now, one of the procedures in the case of infectious diseases is the expulsion of the self-poison. The violent fever caused by the infection is the process of casting out

the stored-up self-poison, and the action of the disease-germ thus militates against itself, provided that the patient is in fresh air, and thus really gets rid of his self-poison.

2. Another fact which is not correctly understood is that which is known in the technics of fermentation as exhaustion of the yeast, and in the case of infectious diseases is designated by PASTEUR as weakening of the ferment. This proceeds from two causes :—

(*a*) The production of a self-poison which first diminishes the vital energy, and, in an adequate degree of concentration, destroys life, is not confined to human beings, but is a characteristic of every organism, and therefore of the disease-germ also. To take the best known phase of fermentation—that of wine. The alcohol formed by fermentation out of sugar is the product of a secretion of the fermenting fungus, and constitutes a self-poison for the latter as soon as the alcohol has reached a certain concentration, causing the fermentation to cease ; and this occurs even when sugar is present in sufficient quantity, otherwise it would be impossible to produce a sweet wine. Precisely the same thing takes place with the disease-germ. The specific smell by which every experienced physician distinguishes scarlet fever from measles, typhus from cholera, is a specific secretion of the disease-germ, which becomes a self-poison for the germ so soon as it has accumulated in sufficient concentration in the patient's body. This is the reason why a person who has passed through such an infectious disease is for a long time not susceptible to be infected with it again. To put the matter shortly, just as a wine ceases to ferment when it has acquired a sufficient alcoholic strength, so an organism is no longer susceptible to infection when it has gone through the fermenting process with the particular disease-germ. A person becomes, however, liable to be re-infected when the specific excretion

of the germ has wholly disappeared from his body, but this usually takes several years.

(*b*) In the foregoing is shown the change which takes place in the fluid which nourishes the germ, and the second point is the change in the disease-germ itself. Just as poisonous plants lose their poisonous quality when grown in soil impregnated with human matter, the disease-germ, when it has multiplied, or, as it were, grown up, in the human organism, becomes "humanised," and loses its capacity of infecting. This, and nothing else, is the weakening of ferments practised by PASTEUR.

To sum up, susceptibility to infection, *i.e.*, to fermentation, ceases, firstly, because the stored-up self-poison is ejected, and, secondly, because the body is impregnated with the self-poison of the disease-germ; and the disease-germ loses its capacity to infect when impregnated, *i.e.*, "humanised" with human odour. Thus it can be understood how an infectious disease may find a natural cure without any further assistance than the sojourn of the patient in the fresh air, and how it is that every epidemic dies away.

XI.—THE CONDUCTIVE METHODS OF CURE.

THE fact that the most varied kinds of diseases simply heal of themselves, under the single condition that no hindrance be opposed to the attenuating process of the disease-matter, has given rise to a School of Medicine which names its method the "expectant," *i.e.*, waiting for the issue, or leaving the disease to work its own cure. This method is under all circumstances to be preferred to that which seeks to effect a cure with concentrated poison-

matters, while carefully excluding so-called "draught" of air, a treatment which is founded on a complete misunderstanding of what disease and its cure consist in. The claim, however, of the "expectant" method to the best system of cure, is again founded on a misconception of the nature of disease and of its cure, especially when regard is not paid to the main factor in self-cure, namely, the placing of the patient in the fresh air. It must not be forgotten that time is also an element in the cure: it is not a matter of indifference whether a person be ill one week or four. Further, in a number of diseases there is an effusion of morbid products, called exudations, in the bodily cavities, or in the intervals of tissue. This is due to the disturbance of the larger mechanism and of the state of the tissue, created by the disease-odours which are set free. The process of cure is thereby complicated, in that it has not only to do with the ejection of the disease-matter proper, *i.e.*, the stored-up self- or extraneous poison, but also with the expulsion of these supplementary morbid sweatings, which is a still more difficult and lengthy task for the organism. The capital question here is whether there are not means of intercepting this second portion of the history of the disease—the formation of the morbid exudation—and of thus cutting short the natural course of the disease. The "expectant" School of Medicine is wrong in denying the possibility of this, inasmuch as the thing is perfectly practicable. We will now examine wherein this practicability consists.

In the healing process we have to do with two factors, firstly, with the disease-matter, secondly, with the body of the patient. Thus the healing process can be entered on in two ways (1), by attacking the disease-matter directly with attenuating or expelling forces; and (2), by enhancing the vital activity of the organism, especially its activity in

excreting. We will take the second case first, postponing the other to the next chapter.

The organism demonstrates its existence by the continuous outward ejection of matters; and the attenuation of disease-matters, in so far as they are not too firmly fixed in the tissues, is effected by means of these excretions, in proportion to which it increases or diminishes. Here then is clearly the point of leverage, in augmenting the body's activity of excretion. Further, as man has not one, but several ways of excreting—through the skin, the lungs, the kidneys, and the intestinal canal—there is again a certain casuistry in the methods of treatment, even with reference to the seat of the source of the disease. Here we will distinguish two leading cases :—

The first is when the source of the disease is situated in the so-called *primæ viæ*, the digestive canal. The "expectant" School has smiled with pity at those physicians whose first step in a case of fresh illness is to give either a purge or an emetic. Yet everyone knows that either an overloaded stomach or constipation of the bowels may induce most pronounced conditions of disease; it can only be considered as self-help on the part of nature, that in certain circumstances, when the stomach is overloaded, vomiting sets in of its own accord, and that in other cases, for instance when the disease is due to improper food, nature seeks to expel it by means of diarrhœal evacuations. The proverbial expression *Speikinder—Gedeihkinder* (children thrive who easily vomit) applies as well to grown-up persons, who, if they easily and quickly vomit, seldom suffer from disturbance of their digestion. On the other hand, people of habitually constipated habit are always worse in health than those of an opposite nature in this respect. We stated at the commencement that Disease is Stench, and when a physician approaches a sick bed he should simply

use his nose to ascertain the cause of the stench. This will at once tell him, even when the patient can give him no information as to the origin of the illness, whether the odour arises from the contents of the stomach or of the intestinal canal, and then he has either to empty the former by means of an emetic or the stomach pump, or to free the intestinal canal by administering an aperient or a clyster. That this must be done, *i.e.*, that the source of the evil-odour must be removed, cannot be doubted; and the only debatable point is whether to choose the mechanical method of emptying, by the stomach pump (or putting the finger down the throat) and the clyster, or the method of applying medicaments in the shape of purges and emetics. This, however, can be readily decided. All purges and emetics are concentrated substances, which, even when they fulfil their purpose, set up a medicine-illness that requires to be cured in its turn; and for this reason the mechanical method of emptying is always to be preferred. It is a different matter when the disease-odour is found not to proceed from the contents of the digestive canal, and when therefore the source of the disease must be situated somewhere else; for the question then arises whether the disease-matter is to be traced to the intestines, the kidneys, the lungs, or the skin. This question cannot be answered offhand for all cases in a uniform manner; but the following points in connection with it may be taken as certain:—

1. It will be found most advantageous to turn the attention to those secreting organs which are continually discharging, and not to those which only discharge at greater intervals; the former are the skin and lungs, the latter the intestines and kidneys.

2. We shall do best to address ourselves to those organs, such as the lungs and skin, in which the secretion from the blood takes place directly outwards, instead of collecting in

a reservoir, as is the case with the intestines and kidneys. It should not be forgotten that disease-matters, when moveable at all, are volatile, and therefore to some extent pass from these reservoirs back again into the blood, and moreover set up injurious effects in the reservoir itself.

3. An increase of the excreting action of an organ mainly depends on securing a stronger circulation of the blood, and on weakening the resistance of the walls of the vessels, and of the excreting surfaces, to the passage of matters through them. This increased activity, however, may very easily grow to excess, constituting for the organ a danger which will be greater or less in proportion to the delicacy of its structure; hence it is advisable to deal with the least delicate organ, and we are therefore led directly to consider the skin.

It will thus be seen that when there are not quite special reasons for conduction by way of the intestines through purging, or by way of the kidneys through diuretic remedies, it is well not to artificially augment these secretions, but simply to take care that they continue in a regular manner. Conduction by way of the lungs must also be objected to on account of the delicacy of this organ, and because, if the first condition of every disease-cure—placing the patient in the fresh air—be carried out, that alone increases the interchange of matter in the lungs, which therefore cannot bear further stimulus. Thus the skin remains as the chief point of attack for an active curative treatment, when no reasons of quite special nature bar the way.

This is the basis adopted by the so-called Natural Doctors. They endeavour to enhance the activity of the skin, and therewith the excretion of disease-matters, by the various modes of treatment, of which we will now proceed to consider the most important.

1. The EXERCISE CURE, which is so far connected with the question of the excretion of the skin, as bodily movement stimulates the circulation of the blood and therewith the action of the skin. When the body is warmed by exercise, not only are the blood vessels of the skin more replete, but, as the rapidity of the circulation increases, more blood passes through them in the same time than if the body were at rest; moreover, exercise enhances the exhalation of the skin by increasing its warmth, and by better ventilating the air within the clothing. An additional advantage of the Exercise cure is that it augments the secretion through the lungs, but therein also lies one of its dangers. If the Exercise cure be exaggerated, the lungs may sustain an injury from too great pressure of blood. On the other hand, the Exercise cure, which I, of course, understand to mean active motion, sometimes called Healing Gymnastics, is only capable of limited application, namely, by patients who possess sufficient strength. Another dubious circumstance about Healing Gymnastics is that they cause a consumption of matter and force, thus throwing on the organism the task of expelling, not only the matters of disease, but also those of fatigue, *i.e.*, the products of decomposition due to muscular activity. It is further necessary to make the following reservation: It was stated above that the first condition of every cure of disease is removal to the fresh air; hence the so-called room-gymnastics are a very precarious method of cure, unless at the same time all doors and windows are opened. Lastly, it must be remarked that the Exercise cure, as a universal cure, must be carried to a point at which the perspiration breaks out, for the disease-matters issue from the body specially with the products of the sweat glands.

2. The SWEATING CURE, or rather cures, for there are

several ways of producing an outbreak of perspiration, is directly allied to the Exercise cure. They may be divided into two groups, the physical and the medicinal. To the former belong the bath methods, the Russian steam bath or the Turkish hot air bath, excellent methods of expelling disease-matters, but unfortunately not always available, and only accessible to the more wealthy classes, wherefore sudorific medicines, such as elder tea and others, will always remain in general use.

3. The PACKING CURE, according to PRIESZNITZ. This process is not free from objection; it rightly aims at enhancing the skin's secretion, but not on a quite correct principle. Anyone who has been thus entirely, or even partly, inwrapped, knows that the laying on of the wet linen produces a feeling of icy chill, because the blood vessels of the skin are subjected by the two factors of the evaporation of the water and the odour which proceeds from the vegetable fibre, to spasmodic contraction, and to repulsion of the blood from the skin to the interior. It is true that the outside woollen wrapper procures the return of the blood to the skin, which moreover ensues in accordance with the law that to every spasm of a vessel there follows in consequence of the lassitude of the walls of the vessels a subsequent relaxation, *i.e.*, more than average dilatation. This latter is the object aimed at, and produces the desired effect, while the first operation, whereby the blood is repressed from the skin, is, according to all that has been stated, completely opposed to the purpose of the cure, and is therefore not only an unnecessary, but if not dexterously managed, even a dangerous procedure. Lastly, when, as is very frequently done, an impervious material like oiled silk or indiarubber is laid over the woollen wrapper, the whole affair becomes nonsense, because the

disease-matter is prevented from escaping. The fundamental error in the whole affair lies, as in our clothing, in employing texture of vegetable fibre for wrapping material. Every one can convince himself that by packing the patient simply in a woollen blanket, or if necessary in two, quite as much increase in the action of the skin can be produced, without the above-mentioned dangerous repulsion of the blood to the interior, as occurs when the PRIESZNITZ Packing is applied according to rule; while if it is desired to enhance the effect, a thin woollen cloth which has already been in use—*i.e.*, is impregnated with human self-medicine—may be applied as the first wet wrapper. The health-matter, becoming volatile through the evaporation of the water, causes an abundant dilatation of the bloodvessels of the skin, and the disease-matters coming from the body pass freely away with the vapour into the atmosphere. I call this mode of packing, when applied dry, the Woollen Packing, and, when applied wet, the Woollen PRIESZNITZ.

4. The REGLIN Poultice, two hand-breadths wide, invented by Frau Elise REGLIN, of Stuttgart, partakes of the PRIESZNITZ idea, and is applied locally to the front middle line of the trunk, from the pit of the neck to the abdomen. According to the law of the cutaneous circulation, explained in Chapter 4, this poultice, while of course much simpler than the process of packing the entire body, produces nearly the same effect, and presents the additional advantage of the free passage of the skin's exhalation from the portion of the surface not thus provided with an extra covering. Further, Frau REGLIN, instead of wetting the first layer simply with water, very sensibly uses a spirituous, aromatic essence. As all spirituous, aromatic embrocations are known to rapidly warm and redden the skin, the usual objectionable recession of blood from the skin at the first application is by this addition pre-

vented, or at least greatly diminished. The same principle—namely, the restriction of the stimulus imparted to the skin to places where the bloodvessels of the skin terminate—is followed in the practice, long adopted in the art of healing, of applying stimulants, such as a mustard plaster, to the palm of the hand or sole of the foot, and of using hand and foot baths containing stimulants which act on the skin.

5. *The Hydropathic Treatment.**—This is applied in various forms, either as a simple bath for the whole body or for special parts, or mechanical effects are introduced by means of shower baths or shampooing; a further modification is afforded accordingly as the water is applied in a warm or cold state. This kind of non-medicinal cure, which has many adherents and supporters, cannot be altogether commended, for it is made up of good and bad elements, and there is considerable confusion in the arguments advanced in its support. A bath at the right time, taken in the right way, is undoubtedly wholesome, but just as certainly a bath may under other conditions be dangerous and even fatal; wet is by no means an element of health any more than is cold. "Warm and dry" is proverbially associated with well-being. A cold river bath is doubtless beneficial when hot, damp air has caused too great prostration of the skin's bloodvessels, and a consequent poverty of blood in the interior organs. The bath restores the vessels to a condition of vigorous contraction, and reinstates an equilibrium of the distribution of the blood. But the same bath, if too prolonged, may work an injurious effect, either because the repulsion of the blood to the interior is continued for too

* I refer here only to treatment with ordinary water, and not with waters containing mineral or other medicinal matters, which will be treated of in the following chapter.

great a space of time, which is equivalent to repressing the exhalation of the skin, and therefore also to preventing the expulsion of disease-matters, or because the subsequent reaction—*i.e.*, the fresh relaxation of the skin's bloodvessels —again produces poverty of blood in the interior.

It would lead us too far if I were to describe in detail the dangers connected with bathing, and, moreover, it is unnecessary, for everyone knows them. Mischief may result from bathing too long or too often, from the bath being too warm or too cold, from entering the water when heated, or from acting imprudently after leaving the bath. It is therefore clear that the bath, for purposes of healing disease, is decidedly a kind of two-edged sword. This is confirmed by observation of animals (birds and mammals) which may be compared with ourselves. Nature has everywhere provided them with arrangements whereby the surface of the skin and the hair and feathers are kept oiled, protecting against the penetration of water, which points to the conclusion that not water, but oil, is a favourable factor for the action of the skin. Further, if the bath were such an important element of health as the water-fanatics would have us believe, all mammals and birds would bathe, and thus no mammal or bird-life would be possible where the opportunity of bathing is wanting. But in neither respect is this the case. There are a number of animals—I need only name the feline races, and, among the birds, the domestic fowl—which never bathe. Further, if we investigate the habits of animals which bathe from time to time, we see that they do not wet the skin, but the plumage or fur. The skin underneath remains always dry, through the oil supplied by the animal itself, and because the oily hair and feathers retain the air. Thus, the bathing of these animals is not analagous to our bathing, but to the washing of our clothes. The matter becomes perfectly clear if we

examine the diving and swimming mammals and birds. Here the provision for oiling the hair and plumage are much more fully developed than in the case of those animals which only bathe at times, so that, for instance, a diving duck returns perfectly dry to the surface, and a fish otter only need shake itself to be dry. The skin of the hippopotamus is so completely overlaid with oil that water runs off it as from oiled paper, while the actual skin of the whale is thoroughly protected from wet by a layer $\frac{5}{8}$ in. thick of hair standing perpendicular, without any interstices, and firmly plastered together. Thus, from the fountain head of all natural knowledge—the observation of unsophisticated Nature—we may learn: (*a.*) That bathing is not, under all circumstances, incumbent for the preservation of health, but is only suitable for certain conditions. (*b.*) When bathing takes place the skin should be protected by oil: just as the bird after the bath oils its plumage afresh, so should man oil his skin. We learn this not only from the animals, but also from the ancient civilised nations, which formed and developed the system of bathing, such as the Jews, Greeks, Romans, and the Oriental nations of the present day. It was and is their habit after the bath. to anoint the body with fragrant * salves and ointments; and inasmuch as our modern bathing system has dispensed with this element, it is of very doubtful value. To the wool-wearer I here give this decided advice: he can bathe as often as he feels the need, but he should afterwards anoint himself, or draw the woollen clothing over the dripping wet body; because by the resulting wetting through of the

* To these fragrant odours belong not only the vegetable aromatics, which are purposely mixed with both oils and salves, but also the fragrant human health-matters, which the fatty substances attract and store up from the air. Compare what is stated respecting oil, on page 10.

underclothing the health-matter, which contains the self-medicine, and which the clothing has previously absorbed, is again rendered active, thus creating something similar to the effect produced by the anointing. Moreover, the slight cooling through the evaporation counteracts the excessive dilatation of the bloodvessels of the skin, which follows the stimulus of a bath. In the case of those who are unsanitarily clothed, the chilling influence of the vegetable-fibre clothing protects against congestion of the skin; and, indeed, such persons *must* dry themselves before dressing, if they are not to incur the danger of a lengthy repulsion of the blood from the skin. (*c.*) In the cure of disease, the simple water bath is an element which may work as much injury as good, and therefore does not stand in the front rank of methods of cure, most of which are superior to it.

4. The *Temperature Cures.*—These may of course be carried out on the dry or on the wet plan. To the latter modification may be applied the observations already made respecting the treatment with water, and I will now only discuss the influence of temperature in itself. We here encounter the fact that warmth and cold are both employed in the healing art, and the first question is whether this be justified. That warmth is a factor of healing needs not to be proved, for the process of warming, especially when the skin is concerned, must certainly exercise an attenuating and expelling effect on disease-matters, particularly if the warming be carried to a point when perspiration breaks out. On the other hand, it is very questionable whether cold can be called a healing factor. Of itself, at all events, it runs completely counter to the purpose of healing, which requires that the secreting action of the skin be augmented—in other words, abundance of heat and blood. The application of cold to the skin has the opposite effect: the blood is driven back into the interior, where it may cause overheating,

and the exhalation of the skin is arrested, whereby the disease-matter is retained. As a matter of fact there are few methods of cure with which more harm is done than with cold wrappings, ice-bags, cold baths, and the like. For instance, at the commencement of an attack of inflammation of the lungs, or of pleurisy, in fact whenever there is internal excess of blood, or inflammation, to place cold wrappings on the skin is the greatest conceivable mistake, arising from the erroneous assumption that the cold can penetrate to the seat of the inflammation. There are two reasons why this is impossible. *a*. Flesh is one of the very worst conductors of heat or cold. *b*. The repulsion of the blood from the skin by the cold diminishes the normal surrender of the heat produced in the interior of the body; and the cooling influence which the cold wrapping is intended to exercise on the interior is not only nullified, but changed into the opposite—a cold wrapping on the skin causing increased pressure of blood, and raising the temperature in the interior of the body, an exactly contrary effect to that which is desired. The plan of removing excess of heat by the action of cold in the skin could only be successful if our bloodvessels consisted of rigid tubes, like the cooling pipes in a brewer's vats. It would then, of course, be practicable to operate from every point of the surface on the heat of the whole body. But such is not the case. The mere fact that a healthy person maintains the same temperature in the interior of the body, whether the thermometer marks zero in winter or 100 degrees Fahr. in summer, simply by altering the transverse diameter of the bloodvessels of the skin, proves that the application of cold to the entire skin, or to a part of it, may be rendered wholly inoperative in the body's interior, and may indeed produce quite the contrary effect to that intended. In the latter event arises the difficult complication that the actual cause

of disease—the previously stored-up self-poison, which has been set in motion—is repressed into the body, and its quantity is increased through the diminished withdrawal of the fresh self-poison continually being formed. Those who defend the use of cold in healing allege that there are cases of disease in which either the general or local bodily temperature has reached a dangerous height, and that it is therefore requisite to draw off the heat. Granted, but at what point of the body is the heat to be surrendered?

We must remember that the symptoms to be noticed in a sick person are not solely those of disease, but that a portion of them are due to the action of the organism in its endeavours to throw off the disease—in technical phrase, to reactionary symptoms. One such symptom is a very hot skin in cases of fever and inflammation, in order to increase the expulsion of the disease-matter through the skin. The organism is thus doing what the physician also seeks to do, and if the physician commits the blunder of setting up an impediment, by the action of cold, to the endeavour of the organism to throw off heat through the skin, it has no other way to accomplish this than that of the lungs. The blood driven from the skin rushes to the lungs, and it is intelligible, when the delicacy of this organ is considered, that, as experience teaches, apoplexy or inflammation of the lungs is the consequence of the faulty treatment. This danger of the blood being repressed from the skin is known in medical practice, and it is sought to maintain the blood in the skin by dint of rubbing and kneading in the cold bath, but whether this is successful, and successful at the right time, depends on circumstances so incalculable that the treatment simply amounts to "kill or cure." For this reason the cold bath has been quite abandoned in cases of typhus; warm baths are given, and champagne, which is known to drive the blood to the skin, so

that the irritational treatment with cold has fortunately given place to treatment with heat. In short, the pressure of blood to the skin is an effort of nature to heal by expelling the disease-matters together with the excess of heat, and this endeavour must not be counteracted; on the contrary, it must be assisted, and, at most, excessive congestion be guarded against. To this end, neither cold nor wet should be employed, but unctuous matter, by anointing the whole or parts of the body, a method which is already adopted, particularly in febrile diseases, by not a few physicians, with very good results. I have myself, in times past, treated the not infrequent feverish condition of my children with unvarying success by anointing the whole body. Rubbing in an unguent has a softening and quickening effect on the skin, which can then bear a stronger pressure of blood without danger; and a passage is opened through the skin for the escape of the excess of heat, together with the disease-matter which is in motion in the body. The objection often made, that by rubbing in unguents the pores of the skin become choked, is an absolutely mistaken prejudice, or nature would have stultified herself in providing the skin with the sebaceous glands. Fluid fatty matter can no more choke the pores, than a leaky cask can be rendered watertight by applying oil to it.

The treatment of a local internal pressure of blood may be gathered from a consideration of the following facts:—If there be anywhere in the body too much blood, there is too little in other parts, and the problem is to apply a stimulus to the places where the deficit exists, in order to dilate the vessels, *i.e.*, to cause them to draw in blood, thus contending with the excess of blood elsewhere. If this excess be deep in the interior, the blood must be drawn away to the surface; therefore, in a case of inflammation of the chest, not ice-bags, but mustard plasters and

blisters, should be applied to the skin, when nothing else avails. It will, however, be best, under all circumstances, to draw the blood if possible into the whole skin, which can nearly always be effected by stimulating the parts of the body indicated by the law of the cutaneous circulation. If, however, it be a case of congestion in a whole region of the body, including the skin, the blood should be conducted to the parts of the body situated in an opposite direction; for instance, when there is congestion of blood in the head, we should not apply cold bandages to it, but we should endeavour to draw the blood into the hands and feet. If the congestion be in the hand or foot, the law of the cutaneous circulation teaches us not to apply a cold bandage to the hand or foot, but a warm one to the arm or leg, when, as was explained above, the bloodvessels in that portion of the member between its extremity and the bandage will contract, and the congestion will be removed. In short, the employment of cold as a means of cure is an error of the modern schools of medicine as pregnant with disaster as is the employment of concentrated matters in pharmacology. If the first condition of curing disease be fulfilled by giving the patient access to fresh air, where the heat and the disease-matter can disperse, and if, in case of necessity, the plan of anointing the skin be adopted, the case will not easily be lost through internal superheating.

There has recently been introduced, chiefly by Rickli, a method of cure which belongs to this category, and consists in exposing the patient in a naked condition to the air and sunshine (air and sun bath), and further in clothing him in a light costume which leaves a considerable portion of the body uncovered. This cure certainly complies with that which should be the aim of all attempts at healing, viz., attenuation and expulsion of disease-matter by increasing the action of the skin; and its author has rightly recognised

in our prevalent system of clothing an element adverse to the skin's action, but he has only gone half way; the portion of the body which he allows to be unsanitarily clothed remains subject to injurious influences, and as for dispensing with clothing altogether—well, not even in Africa would that everywhere be tolerated at the present day.

The subject of RICKLI 's treatment would naturally lead us directly to consider the Sanitary Woollen System Cure, but I will deal with that in a separate chapter, the 14th.

XII.—THE MEDICINAL METHODS OF CURE.

IN the methods of cure described in the two previous chapters, the attenuation or expulsion of the disease-matter is effected by external operations on the body. There is, however, an alternative way, namely that from the interior outwards, by introducing things into the patient's body which expel the disease-matter, and this method comes chiefly under the head of Medicinal Treatment. The number of medicines is well known to be almost unlimited, but we may, notwithstanding, state certain general requirements which every medicine must possess to be available for the purpose of cure.

1. As the expulsion of a matter is in question, the medicine must possess motive force, *i.e.*, abundant molecular movement, for that which is to be expelled also consists of molecules; the molecular movement of the medicine must exceed in intensity that of the disease-matter, which may be shortly expressed thus, the medicine must possess vivifying force.

If we consider this more in detail, we find:

a. A volatile matter is much more adapted to medicinal purposes than one which is less or not at all volatile, for centrifugal force is tantamount to motive force.

b. An attenuated matter whose molecules possess, in consequence of the attenuation, a much greater molecular movement, is better suited for medicine than the same matter in a concentrated condition.

2. We have laid down the general proposition that disease is stench; health is fragrance and odour. It follows with certainty that matter which smells, and also of course tastes, badly, cannot of itself be a medicine, but necessarily causes fresh illness. If, notwithstanding, as is undeniable, many cures are effected with evil-smelling substances, the reasons are two:

a. We saw in the previous chapter that increased secreting action of any one of the organs concerned may be a means of allowing the disease-matter to withdraw. This increase may be induced in two ways, either by stimulating the active working of the organ, or, conversely, by a paralysing influence, which enhances the passive capacity for filtration of the secreting surfaces. This contrast may be best observed with reference to the skin. Active perspiration is, for instance, that which ensues on heating bodily exercise or on taking a warm drink; passive, paralysing perspiration is the cold sweat of terror, or of death, or the perspiration caused by an emetic. Only attenuated medicinal substances produce active working, those which are concentrated causing secretions of a paralysing nature; and as the latter may, under some circumstances, render assistance, concentrated medicinal substances (emetics, aperients, &c.) may, under certain conditions, effect cure, but not without setting up medicinal disease.

b. Another ground for successful cure with concentrated medicinal substances is, that, if after such a medicine has been taken, it has not a propensity to settle in the body, the organism subjects it to attenuation by discharging portions of it through natural channels. So soon as this

attenuating process has reached the degree of fragrant odour, the substance becomes, in fact, an attenuated medicine. This is the so-called after-effect of medicines, which, however, of course first asserts itself when the medicine has ceased to be taken. In attempts to cure with concentrated badly smelling and tasting substances, it has happened thousands of times that so long as the patient has taken the prescribed medicine he has not recovered; but when at last he has lost patience and thrown the medicine phials out of the window, the cure has commenced both of the actual disease itself and of that induced by the medicine. The cure would, of course, have at once been effected if this substance had been administered from the first in a sufficiently attenuated state. We are thus brought to the conclusion that only that is medicine which is in itself fragrant, and therefore an aroma, or is at least attenuated to a point at which the evil smell and taste are converted into the opposite, which is known to be practicable with every substance, even the most mal-odorous.

3. The elimination of the disease-matter being the object aimed at in healing, the purpose of medicine should not be to suppress it, but to stimulate it, and as the least dangerous region for the expulsion was shown, in the previous chapter, to be the skin, such medicines are generally preferable as enhance the action of the skin: this coincides with the well-known healing power of medicines which excite active perspiration.

4. The expulsion of disease-matter requires greater activity, not only of secretion, but of the whole of the vital processes; hence, no medicine should be employed which exercises on these latter a paralysing, checking, or, as it is erroneously termed, a soothing effect. Here again should be noted a faulty method of healing, in the employment of narcotics like opium or morphia for procuring sleep and

a soothing effect. At most they are permissible when it is not sought to cure—*i.e.*, when the disease is really incurable, —in that they diminish the sensitiveness of the organism to the disease, and therewith the feeling of disease whereby the patient is chiefly incommoded; also, when the natural efforts of the body to expel the disease-matter become so violent as to threaten mechanical, *i.e.* anatomical, injury. But even in these cases narcotics are a two-edged sword. So soon as the patient ceases to make use of the soothing remedy, the portion of the narcotic substance still present in the body begins to undergo attenuation, and when this has reached a sufficient degree, it no longer soothes, but on the contrary excites; and resort must again be had to the medicine phial or the injecting syringe. Thus the patient is not only uncured, but is delivered over to a chronic medicine-disease, such as morphinism, a state which is not infrequently worse than the original disease.

Taking the above collectively, we can easily judge in each separate case, as indeed can the patient himself, whether a substance is fitted to serve as medicine. That which smells and tastes badly may be rejected as unsuitable, and if once patients could be brought to do this there would be an end to all the mischief worked by medicine. Very simple, also, is the matter from its positive side: everything which is fragrant or has a "fine" smell is a healing factor, and equally so whether it falls under the denomination of medicine or of food.

How is it that we, notwithstanding, clearly distinguish between medicine and food? This question leads us to the following important fact. Every creature, including man, makes choice among the quantity of matters which are available as food, and is guided by its senses of smell and taste. Food which smells badly causes a feeling of disgust, and if we nevertheless take it we do ourselves harm. This

choice is narrower or wider as the case may be. Further, we find that not every kind of animal, and among men, not every individual, makes similar choice. Every man is said to have his own sense of taste, and to this must be added, that he has his own sense of smell, *i.e.*, if he likes the taste of mutton he will like the smell; while if he dislikes mutton, not only the taste, but also the smell, will be disagreeable to him.

So soon, however, as a person becomes ill, his disposition towards his accustomed food undergoes a change; firstly, he has little or no appetite, and secondly, he feels disgust at his natural food, which indeed it would now be injurious for him to take. At the same time desire is felt for things which would be absolutely declined when the person is in health, because they smell and taste to a healthy person offensively; in a sick condition this feeling is transposed, and the things in question are now the natural medicine. We will again consider the subject in relation to the animals, from whom all our knowledge respecting it is derived.

If a mountain pasture be examined, certain plants, especially the grasses, will be found to have been carefully eaten off. These form the cattle's natural food. Other plants remain untouched, and it is easy to ascertain that such are either poisonous or at least taste disagreeably to the healthy animal, as indeed most of them also do to human beings. If, however, one of the cattle becomes ill, it rejects the herbs on which it naturally feeds, and seeks with its nose among the poisonous or disagreeable plants above referred to until it finds one which pleases it,—*i.e.*, which it finds to be fragrant; it then eats it, and the result shows that this was the proper medicine. The same thing may be observed of our house-companion, the dog. The dog is known to be an eater of flesh, and not of grass, and yet at times he is seen to eat grass. When he does this it may

easily be ascertained that he is ailing, by touching his nose, which will feel warm, or by offering him meat, which he will refuse. Further, the dog, after a few minutes, usually vomits, when the grass is returned the same as it was swallowed. Thus meat is the natural food for the dog, and grass is medicine. The foregoing shows that the irrational animal, by using its sense of smell, not only discovers the nourishment suited to it, when it is healthy, but the medicine which it requires when sick. To say that this is due to an instinct with which man is unfortunately not endowed is precisely the fatal error into which the one-sided cultivation of their understanding has plunged civilised men. Man is possessed of instinct equally with the animals, but the demonstration of instinct is associated with the use of the sense of smell, which is of primary service to it. The instinctive action of an animal is first to snuff at all objects, especially at such as are unknown to it, and not to make use of that which is mal-odorous, but only of that which smells agreeably. That man possesses a similar faculty is easily ascertained with reference to food. Every food which is wholesome for him will smell agreeably to him, and that which smells disagreeably is not good for him. Of course experience, *i.e.*, the intellect, can also guide him here; but as knowledge always remains fragmentary, experience will in numerous cases leave him in the lurch, while instinct, *i.e.*, testing with the nose, is unerring. When we find a berry in the woods, its appearance of itself tells us nothing at all as to whether it is fit to eat, unless we have the necessary experience. Appearances are therefore rightly termed deceptive, and the only safe guide in this case is the nose; the eatable berry when crushed smells well, and the poisonous berry smells badly. As regards food, however, man possesses his instinct in proportion as he uses his nose, not merely when he is healthy, but also when he is ill; for

the sick person complains of the smell of his natural food, and shows by refusing it that his instinct is correct. Why, then, should it err with respect to medicine? nor does it, as I can prove by the following facts.

One of the plants which healthy cattle in mountain pasture will not eat is felwort, another is the bitter wormwood, from both of which is manufactured bitters. If a healthy person smell and taste such bitters, he will pronounce it to be execrable; but if his stomach be upset, and he feels a loathing for his natural food, the taste and smell of the bitters will be agreeable to him, *i.e.*, will be a medicine for him.

Another instance is afforded in the so-called "longings." It constantly occurs (especially to the female sex, who are gifted with finer feelings, and take more note of them than men, who are for the most part schooled out of paying any attention to instinct) that after a lengthy ineffectual treatment of a sick person, an irresistible longing arises for some food or delicacy apparently wholly unsuited to the case. When those in attendance are sensible enough to humour this longing, recovery regularly sets in.

It follows from this that every sick person is in a better position than any doctor to himself ascertain, with the assistance of his sense of smell, the correct medicine in every case. Doctors commonly enough recognise this by advising the patient to test for himself, at least within the range of the invalid dietary, what suits him, only they forget to tell him how he is to apply the test. This must not be done by swallowing the food or the medicine, for if either of these be wrong the mischief will then have been done. The test must consist in the object being smelled by the patient. If the odour make an agreeable impression, and at the same time create a feeling of appetite, then the object is the correct food or medicine.

The first duty of the physician is not, therefore, to prescribe a medicine to the patient, but to enable him to find for himself the right medicine. The physician should have by him a case of medicines, containing in the smallest doses the various medicinal substances whose healing power has been affirmed by experience; and should allow the patient himself to find out the best through his sense of smell. To say that the number of substances possessed of healing powers renders such a course impracticable is erroneous, for it is not required to test all and sundry medicines, but only a small group whose bearing on the disease in question experience has long established. The doctor who is called on to treat a person sufferring from a stomachic disorder has only to choose among about a dozen stomachic remedies, and when it is a case of headache, the choice is among the remedies for headache.

In a practical sense we have now finished with the subject of the most suitable medicinal treatment, but we have not only to consider in this section of natural science what should be done, but also to gain comprehension of why it should be done. Hence arises the inquiry, why is it necessary to choose? Why cannot any given disease be cured with a given medicine possessing the general properties described at the outset? And why cannot one and the same medicine cure the same disease in any given person? for it is an absolutely established fact that every individual disease requires an individual medicine, and that a medicine which has actually cured a certain person of a certain disease, often fails to act on a similar disease in the case of another person, or even in the case of the same person at a different time. The reason for this is twofold: (1.) The disease-matters are not always the same, but numerous specificially distinct matters can and do act as promoters of disease. (2.) Different persons are specifically,

or as it is usually called, individually, distinct. These two points deserve special consideration.

The Specificness of Disease.—As the odour of disease from sick beds at once demonstrates, every kind of illness possesses a specific smell, so that the disease-matters are specifically different. The healing problem is not to expel from the sick body any matter whatsoever, but only the specific disease-matter. Here the following procedure takes place. The medicinal matter must transmit its greater molecular movement, *i.e.*, its centrifugal force, to the inert molecules of the disease-matter, and the more completely this is effected the more prompt will be the result; while, on the other hand, a wrongly-selected substance is such as does not transmit its centrifugal force to the disease-matter, but either acts on the wrong matter in the body or on none at all. The question is, therefore, what relation must exist between the medicinal matter and the disease-matter, and the answer is, a molecular attraction. The further question as to which substances stand in molecular attraction to one another, may be answered thus:

1. The closest relation of molecular attraction subsists between substances of identical nature, or, in other words, between the molecules of the same substance. Necessarily, therefore, the attenuated solution stands in the same relation to the concentrated solution of the same substance, as medicine and poison, or as poison and antidote, and thus quicksilver poisoning can be cured with an attenuated solution of quicksilver, or arsenical poisoning with an attenuated solution of arsenic. This has been proved a thousand times over in practice.

2. Next to the molecular attraction between identical substances, that between substances with similar physiological action is strongest, *i.e.*, a substance which, in a concentrated state, induces symptoms of poisoning identical

with or very similar to the symptoms of a certain disease, is, in an attenuated state, a medicine for that disease. For instance, Veratrum, in concentrated doses, induces symptoms which are quite similar to those shown in cholera, and therefore an attenuated solution of Veratrum is an effective remedy against this epidemic.

These are not simply assertions for which no proof can be adduced; the proof is not only forthcoming at the sick bed, but is a matter of constant daily experience, namely, that the effects produced by one and the same substance are physiologically opposed according to its degree of concentration. Let us commence with the most indisputable every-day experience.

No one will contest that a little wine or a light, *i.e.*, attenuated wine, has an arousing, animating effect, enhancing the feeling of health, while the effect of much or strong wine is just the opposite, viz., laming of the faculties, intoxication, and a feeling of sickness. On the other hand, every (German) student knows that the indisposition (*Katzenjammer*) which follows an alcoholic excess is cured or improved by taking a small quantity of the same drink which caused the intoxication. This proceeding is known by the slang term of "a hair of the dog that bit him," which, again, is derived from the equally well-founded popular practice of curing wounds from bites by applying to them hair taken from the animal which caused the bites. To the concentrated salivary poison deposited in the wound by the irritated dog is opposed the attenuated specific of the same animal as antidote, and this practice is by no means a superstition, but is thoroughly rational and approved.

2. Our daily experience in the matter of feeding shows the contrast in the physiological action of different concentrations of one and the same substance. Before dinner the

fragrance of the food exercises the animating effect of an agreeable odour provoking appetite; but after the food has been taken, when its specific nature is acting within the body in a concentrated condition, the feeling of appetite is transformed into the physiological opposite—that of satiety, and even of disgust; the animating effect becomes a laming effect, and the odour which was previously so agreeable is now the offensive "smell of dinner."

3. The impression produced by odour is likewise a physiological effect, and that which has been stated respecting the odour of food is true of the odour of every substance. The finest perfume becomes, in sufficient concentration, an evil odour, and the worst odour may be rendered fragrant, if adequately attenuated.

4. Similar experiences may be gathered in the sphere of medicinal remedies. Rhubarb in large doses is an aperient, while in small doses it causes constipation and cures diarrhœa. Much opium has a soothing, laming effect, causing sleep; but if opium be given in an attenuated state it excites, and so on *ad infinitum*. The subject presents itself also in another shape. A diarrhœa induced by an aperient is always followed, so soon as the aperient is no longer used, by the converse—constipation. Inasmuch as the body continually excretes portions of the medicine which has been swallowed, the latter becomes attenuated, and the diarrhœal effect of the concentrated medicine is transformed into the converse constipating action of the medicine in an attenuated state. The same thing happens when diarrhœa has been induced by unsuitable food; this is also followed by constipation so soon as the natural excretions have sufficiently attenuated the specificness of the food.

To return to our subject, it follows from all that has been said above that there must be a diversity of medicines corresponding to the specific multifariousness of disease-

matters, and that the most suitable medicine for a specific disease-matter is an attenuated portion of a matter which is specifically identical with, or specifically similar to, the disease-matter. This similarity need not exist in a chemical sense, but must only do so in a physiological sense.

THE INDIVIDUALITY OF PATIENTS.—There is no more generally accepted dictum than that everyone possesses an individual nature, and that this individuality especially attaches to the chemical senses is expressed in the common saying that "tastes differ." If people would pay more attention to their perceptions by their sense of smell, they would find that in this direction also everyone has his individuality. The best known instance, because it practically occurs every day, of the diversity of natures is in the matter of choice of food. There is not a single human food which is liked by and agrees with everybody without exception, and no two persons can be found whose taste is so similar that they hold the same opinion respecting all foods. In face of this fact it is very unlikely that this individuality of natures only subsists in the matter of food, and needs not to be considered in respect of medicine; in fact, if medical experiences be passed in review, the conviction will soon be attained that in this respect there is no such disparity between food and medicine. Let us take that most used and abused of medicines, opium. Every doctor knows from his own practice that, on the one hand, there are people who can take opium quite well, and in comparatively large quantities, while others cannot support it, and acquire dangerous symptoms of poisoning after taking comparatively little. Doctors also know that age and sex are not alone responsible for a so-called difference of constitution, but that such differences subsist between persons of similar age and sex. This, of course, applies not only to opium, but to every medicine.

I have not the space here to explain in what this idiosyncrasy of nature consists, and must refer any reader who desires to thoroughly inform himself on the subject to my larger scientific and technical works. I must limit myself here to the following: If the medicine is to avail, it must not only be suitable to the disease, but also to the nature of the patient; and as the natures of patients vary, there is no universal medicine which cures everybody of any one disease, just as little as there is any universal food which everybody likes. The recognition of the individually varying attitude of patients towards diseases has at all times caused physicians and schools of medicine which aimed at effecting cures, to regard the art of so-called individualising as the acme of medical skill. But, on the other hand, it is equally clear from what has been said, that even the most skilful physician could not possibly of himself alone completely fulfil this requirement; the co-operation of the patient, whose senses of smell and taste must be consulted, is absolutely indispensable, and so long as medical practitioners do not make use of this factor, they will always run the risk of their prescriptions missing the mark.

The Administration of Medicine.—This may be accomplished by the following methods: swallowing, inhaling, inunction, additions to baths, and, lastly, by injection under the skin. In swallowing, the whole bulk of the medicine passes into the body, as it also does when the method is by injection, and the effect in this respect is nearly the same when the medicine is rubbed into the skin. If we would avoid running counter to the law of attenuation, only attenuated medicinal substances may be employed for these purposes. The concentrated medicinal substances which are least injurious when administered internally, are those which are naturally

volatile, like the specifics of most plants from which a kind of tea may be brewed. The advantage of the inhaling and bathing methods is that only volatile matters have an opportunity of penetrating the body. While on the subject of bath-cures, with waters containing medicinal substances, including of course the mineral water baths, I would draw attention to the fact that of all natural bath-waters those have shown themselves possessed of most curative power which contain the smallest quantity of solid matters—the so-called indifferent baths, like Wildbad, Gastein, &c. This exactly corresponds with the law of attenuation, but is incompatible with the maxim that "much assists much." Further physiological chemical investigations, made as accurately as possible, have shown that in a mineral water bath the body does not absorb any appreciable quantity of the mineral matter; yet the curative effect of the baths, and indeed the specific curative effect, cannot be disputed. The matter is however quite comprehensible. Every individual mineral water has its individual odour which the bather inhales; this is an attenuation of the medicinal substance which is inappreciable to the chemist, and from it proceeds the effect of the bath. It should be added that the skin offers a complete obstacle to the penetration of the actual water, and only allows an attenuation of the volatile constituents of the water to enter into the blood.

XIII.—OTHER METHODS OF CURE.

IN the three preceding chapters we have discussed nearly all methods of cure, with a few omissions to be here supplied.

We have not spoken of the electrical treatment, which has much developed of recent years. If the result of this

treatment in practice be impartially examined, indubitable success is found side by side with indubitable failure. How is this, in view of what we have already stated, to be explained? When an electric current passes through a fluid, or an electric shock through the air, the result is a chemical decomposition of high atomic combustible (oxidisable) matters, with formation of low atomic volatile products of combustion. This is termed electrolysis. As disease-matters are generally high atomic combustible matters, which are less volatile because high atomic, their electrolytical destruction will be not only possible, but will then be attended with successful results. Electricity further stimulates the movement of the living tissues, which may set in motion the stored-up disease-matter. Electricity may however be unsuccessful, for there are no means of restricting its destructive effect specially to the disease-matter. It may just as well light on matters whose destruction and expulsion would be simply injurious; and out of wholly harmless high atomic matters, for instance, the so vitally important albumen, products of decomposition which act prejudicially to the health may originate through the destructive action of electricity. This is especially likely to happen when the electric current is too strong. The electrical treatment is thus another two-edged sword. It may as easily induce symptoms of concentration, and therefore of sickening, as of attenuation, *i.e.*, of cure.

This is the most fitting conjuncture for discussing that which may be termed the chemical cure proper, *i.e.*, the treatment which seeks and effects a chemical destruction of the disease-matters. Here a great misapprehension has to be combated, namely, the idea that every medicinal treatment must tend to chemical destruction of the disease-matter. That is radically wrong. The number of medicinal substances which produce this effect is very limited, and

may be precisely defined. In accordance with our maxim that Disease is Stench, disease-matter is mal-odorous matter, and, as a rule, of so-called organic nature. Now there is a group of matters, the simplest experiments with which prove that, if oxygen be present, they are able to destroy odorous organic matters whether these be fragrant or the reverse. They are called disinfectants or deodorizers. First among them is camphor, famed of old as an efficacious medicament, then vinegar-ether; further, nearly all ethereal oils, such as turpentine, lavender, thyme, &c., &c., and in short, the specific aromatics of a number of herbs which have long been successfully employed for healing purposes.

To the same factor is due the undoubted healing power of the air of pine forests, whose resinous odour forms the element of cure. But it is the same with these subversive methods as with that of electricity, too much is harmful; for the health-matter is also an odorous matter, and is equally exposed to subversion by the above-named agents. Thus health- and disease-matter may be both destroyed by them, and that is injurious. Fortunately, however, the danger is not so great as with electricity. In the first place, it is shown in practice that the health-matter has greater power of resistance than disease-matters to these deodorizing agents, and is not attacked until the latter are destroyed; and then the incipient subversion of the health-matter may be detected by a distinct feeling of laming of the faculties.

Further, so soon as deodorizers are employed in too concentrated a form, they themselves give rise to evil odour and feelings of illness, especially of headache. By making it a strict rule to interrupt the operation of these substances the moment they begin to smell disagreeably, any injurious excess may be guarded against. This method of cure may therefore be availed of with complete confidence, and it

forms an important element in the advice which I give to my patients. I especially make use of an essence which is a mixture of several such deodorizing substances and bears the name of "Ozogen." I would however remark, that under this title preparations are manufactured in the erroneous view that they should serve as disinfectants, *i.e.*, destroy living germs of ferment, and which are therefore rendered injurious through addition of mal-odorous concentrated substances, like carbolic acid, salicylic acid, &c. As to the application of Ozogen, *see* Chapter 44 of this work.

There remains to be mentioned the Dietetic cure, *i.e.*, by changing the mode of nutrition. The abstinence cure doubtless recommends itself in cases where disease is due to excess of eating or drinking, and where consequently a portion of the decomposed products of the food, &c., remains in a stored-up condition in the body, which is a process of concentration. These are partly the specifics of the food, &c., which have been taken, and partly the excremental odours from the same, partly also the fat which has originated from the imperfect combustion of the albumen. It is clear that a change to scanty fare, *i.e.*, to a diminished replenishing, must, in consequence of the regular constant excretion, lead to an attenuation of the excess. But it is equally clear that abstinence has its dangers and its limits, and that unless the abnormal desire for food or drink be removed the patient will relapse. Cures undertaken by means of dietetic change are therefore more efficacious than those by simple abstinence, and the manner in which the former operate is as follows :—

Exclusive limitation for some time to any one food, even when it contains all that is necessary to sustain life, induces after a comparatively short period a certain degree of disgust; if the limitation be continued, actual illness

ensues, and as experiments with animals have proved even loss of life. This is also a symptom of concentration. The specific matters of taste and smell, and the specific products of decomposition of the food, accumulate more and more in the body, inducing actual poisoning through the food, accompanied by inability to digest it, and this is why, in experiments with animals, death has ensued. If another food be adopted, the specific which originated from the first food, and which has reached a poisonous degree of concentration, ceases to be replenished, and there commences through the natural excretory action the process of attenuating the poison and therewith of curing the disease.

From this may be deduced the simple fact that health depends on a certain amount of variation of diet, while if the form of nourishment be too monotonous, especially when in addition a person lives intemperately, the health will gradually deteriorate, and a change of food will then play the part of an effectual remedial treatment. Of these Dietetic cures I will only distinguish two:

(*a.*)—The Vegetarian Cure.—It is a fact which can easily be established, that the digestive exhalations after eating meat are, in consequence of the higher atomic weight of the specific animal matters, much more concentrated, and therefore mal-odorous, and hence of course more dangerous, than after eating vegetable food. Thus when meat is chiefly eaten, the poisonous effect of the food, as described above, appears much sooner and more readily, especially when a sedentary indoor life is led. When this is the origin, or at least an aggravation, of the particular disease, change to vegetable diet necessarily has a remedial effect. As sufficient nutrition can be derived from a vegetable diet, and the danger of poisoning through the food-specific is not nearly so great as with a meat diet, persons who live under unfavourable conditions for the due

exhalation of the skin will find it to their advantage to adopt the former; but unless they arrange for sufficient variety, they will not wholly escape the danger of food-specific poisoning. The advantages and disadvantages of vegetable and meat diet are compared at length in Chapter 53.

(*b.*)—The Fat-Removing Cures, through Change of Diet.—Whereas Hippocrates already knew, and in many places it is matter of common knowledge among the people, that eating fat does not make fat, but rather keeps the body thin, modern science has arrived, after many false starts, at this fact, that, *ceteris paribus*, excessive accumulation of fatty tissue arises from a diet which contains too much so-called carbo-hydrates, *i.e.*, starch-flour and sugar. If these easily combustible substances are in excess, the oxygen taken up by the body does not act with sufficient vigour on the albumen contained in the food, and fat is one of the products of incomplete decomposition of albumen. Fat as such, not being able to quit the body, firstly, because it is not volatile, and then because it does not mix with the watery juices of the body—accumulates in the system. If the diet be so changed that, instead of sugar and starch-flour, fat prevail, three things will be attained. As fat is less easily combustible, *i.e.*, less easily combines with oxygen than do sugar and starch-flour, the albumen secures sufficient time and oxygen for its complete decomposition into carbonic acid, water, and urea. Consequently no increase takes place in the fat already present in the body, and further, as the stored-up fat in the body is no longer protected from decomposition through the oxygen, owing to the oxygen being intercepted by the carbo-hydrates, the stored-up fat consumes in the same way as food-fat, and is gradually removed from the body. Lastly, fat foods satisfy in less quantities because the nutriment which is in the albumen is, owing to the thorough combustion, more com-

pletely used up than it would be if merely re-converted to fat. Moreover, fat by its combustion gives greater heat than the carbo-hydrates, and as foods thus constituted sooner become repugnant to the sense of taste, they cease to be taken in excess; and herein lies in addition to the diminution of stored-up fat, an attenuating element in the direction of the food-specifics. The danger of a poisoning effect is less, and the quantities of these specifics already accumulated in the body are able to decrease.

XIV.—THE SANITARY WOOLLEN SYSTEM CURE.

AFTER reviewing, by the light of fundamental principles, pretty well all methods of cure hitherto practised, there remains, in conclusion, to discuss whether and how the so-called Sanitary Woollen System is in a position to effect cures. As I have elsewhere already remarked, the sole object of my first steps in this direction was to discover a protection against the continual recurrence of illness. When once the right way was found, however, two things soon become apparent:

(1.) A person in whose body disease-matter is stored up cannot permanently be protected from falling ill. A temporary protection is possible, but only by a treatment which continually enhances the storing up of the disease-matter until it reaches a height at which the least impulse suffices to set the disease-matter in motion; and as the quantity has by that time become considerable, the consequence is a severe illness. There is the further disadvantage, that so long as the disease-matter is in the stored-up state, the person in question is by no means thoroughly healthy. He is continually troubled with minor disturbances of the

health, which civilised men have accustomed themselves to regard, not as actual diseases, but generally as inevitable inconveniences of life, and which they very erroneously consider to be not sufficiently important to induce serious effort to procure their removal. On the other hand, such persons suffer from a progressive decline in their vital energy, in their capacity for work, and in their spirits. An examination of their condition reveals all the signs of enervation. They themselves, if they still possess intellect and energy enough to reflect on their state, have an undefined notion that there is "something wrong with them," which may lead to an illness; and in this, experience shows, they are not mistaken, for there comes a day when they have to take to their beds. Any attempts to restore such persons to a better state of health must be preceded by the expulsion of the stored-up disease-matter; and when this is effected by means of a remedial treatment, the symptoms are necessarily similar to those which are apparent when the stored-up disease-matter is set in motion by natural influences, *i.e.*, they take the form of an acute illness.

(2.) Only when the stored-up disease-matter is expelled can a renewal of the disease be guarded against, by a treatment which prevents fresh accumulation; with the additional advantage that the body, when freed from disease-matter, enjoys positive health, as evinced by full vital energy and capacity for work. But here it becomes necessary to combat the idea that this condition is synonymous with a guarantee against any and every form of disturbance to health. If a person whose body has been freed from stored-up disease-matter expose himself to the effect of a poisonous matter, whether it be extraneous or self-poison, whether the poison be human, or vegetable, or mineral, he will not escape poisoning symptoms. What he

will escape is an association with this fresh poisoning, of the highly dangerous motive force of a stored-up, long standing poisonous matter set loose in the body. This dangerous motive force is shortly defined in the chapter on "Chills"; we there saw that the symptoms of disease to which the liberated stored-up disease-matter gives rise are nothing else than the well known symptoms of fever. That which has disappeared from the body of a person who is freed from stored-up disease-matter is *tendency to feverish sickening*. Through the fresh influence of extraneous poisonous matter he may contract influenza, catarrh, diarrhœa, headache, stomachic pains, and the like; but while in the case of an *enervated* body fever is added to all these fresh disturbances to health, in the case of the *hardened* body the feverish adjuncts are absent. That is not merely in itself an advantage—for a catarrh without fever need not materially interfere with the pursuit of ordinary occupations, while when there is fever it does—but also for the following reason: Disturbances of the coarser mechanism of the body, when they last for any time, lead, at some one point of least resistance, to mechanical injuries, such as formation of exudations, congestions of blood, rupture of blood vessels, &c., in short to that which in both lay and professional parlance is termed inflammation. Thus an influence which, in the case of a person whose body is *hardened*, leads to a catarrh without fever, produces, when the body is *enervated*, inflammation of the lungs, pleurisy, or quinsy, diseases which are susceptible of cure, but which only too commonly leave behind a mechanical injury, which in some cases defies every remedial agent.

In connection with the foregoing paragraph, the question whether all diseases are curable must be answered in the negative.

(1.) Diseases due to nothing more than a continued

concentration of the self-poison present in a free condition, *i.e.*, in a state in which it can escape (simple nervous complaints belong to this category), are the easiest to cure. They usually at once disappear on removal of the obstacles to the natural attenuation of the self-poison. It is also comparatively easy to cure the so-called rheumatic and catarrhal complaints, which are due to enervation, *i.e.*, to prostration of the tissues, caused by stored-up poisonous matter (mostly self-poison), and to the consequent internal accumulation of superfluous fluid matters (*Rheuma* means flux), or to the external elimination of superfluous humours (catarrh is derived from *Katarrheo*, to flow off). Usually, however, the cure is not effected without a feverish condition of shorter or longer duration, which must be designated as a healing-crisis. If, on the other hand, the diseased state consist either in a wasting away of vitally important tissue, or in the induration of tissue, or in the accumulation of superfluous tissue, whereby the coarser bodily mechanism is affected, cure is either not feasible, or is only to be accomplished by aid of the knife or by the kneading process known as *Massage*. Medicinal and "conductive" treatment are not indeed always unsuccessful, but in the most favourable case their operation is very slow.

(2.) When the body is thoroughly permeated with quantities of stored-up disease-matter, and the constitution is feeble, *i.e.*, possesses little healing power of its own, and when, moreover, the coarser bodily mechanism already shows numerous defects, the incurability of the case is generally not due to the fact that the disease-matter cannot be expelled, but to the danger that the weakly body may succumb to the inevitable healing-crisis. It is better either to abstain from the attempt to cure, on account of the danger involved, or at most so to proceed that the

expulsion of disease-matter shall be effected as slowly and mildly as possible.

(3.) A third case of incurability will be referred to presently when the subject of the Woollen System cure is discussed.

After these explanations we may apply ourselves to the question raised at the beginning of the chapter respecting the remedial and protective virtues of the Sanitary Woollen System.

The experience which has now been attained in thousands of instances with the Sanitary Woollen System shows that, for sick persons, it is in the first place a remedial treatment, and that its protective virtue is felt after the cure has been accomplished—in other words when the tendency to illness has been expelled from the body. As a remedial treatment the System has shown itself in two directions to be superior to all the other methods described in previous chapters; firstly, in expelling the disease-matter, or the matter which disposes to illness; secondly, in enhancing the effect of the health-matter, in which latter direction all remedial treatments hitherto known are inoperative. These two points require each to be discussed more in detail.

THE RELATIONS OF THE SANITARY WOOLLEN SYSTEM TO DISEASE-MATTERS.

The well-known fact that places in which human stench prevails are the chief source of diseases, and that the most sickly people are those who live among such evil odours, and under conditions which are unfavourable to their ridding themselves of their self-poison, shows that diseases due to self-poison are far more common than those induced by extraneous poison. I believe that I am not mistaken in

ascribing nine-tenths of all diseases to the former source. If that is correct, there follows a two-fold deduction from what we have learned in previous chapters respecting the relations of clothing materials and of the materials of bedding, furniture, &c., to the self-poison.

Firstly, that the Sanitary Woollen System, including the supplementary measures which I have recommended (sleeping with open window, avoiding as far as possible remaining in closed rooms, or where this is unavoidable, employing chemical means of purifying the air—see chapter 44), must be one of the most efficacious methods of curing diseases arising from self-poison.

Secondly, methods of cure cannot succeed, or can only partially or temporarily succeed, which disregard the real source of disease, by neglecting to remove the self-poison that accumulates in the clothing and bedding, and the furniture, flooring, and walls of rooms, impeding the surrender of the self-poison which the body continually produces, and working mischief at every change of temperature and degree of moisture. We will take as illustration the simplest of all cases referred to above.

Everyone knows that bad or too powerful odours cause some people headache, others a feeling of sickness, or diarrhœa, or stomach-ache. Hence it is intelligible that there are odours which may induce pains in the limbs and in the most various parts of the body without the physician being able to establish the smallest anatomical change, even after the most careful investigation, or, if the patient die, after a *post-mortem* examination; such diseases are therefore classed as simply nervous, or rheumatic. Further, it is clear that when these bad odours—the mal-odorous portion of the body's self-poison—are present in the clothing and bedding, and in the furniture, every treatment, whether with internal or external remedies, is futile; and

as a matter of fact the so-called purely nervous diseases are an insoluble problem to our medical science, as is well expressed in the following lines of a humorous poem :—

> Und wenn der Doctor nichts mehr weess,
> So nennt die sache er nervös.
>
> (And when the Doctor's up a tree
> He says, "its on the nerves," says he.)

Now the experience obtained with the Sanitary Woollen System has taught that precisely these purely nervous complaints, which are the despair of medical science, at once disappear on the adoption of my System, never to return, and *without a crisis*. This is of course only in purely nervous cases, *i.e.*, when the symptoms are due to the free portion of the self-poison, and when there is no stored-up self-poison in the back ground, nor any extraneous poison which is for the most part stored-up, and of which small portions are continuously liberated, causing the nervous symptoms. In the latter case the Sanitary Woollen System equally effects a cure, but only by the patient passing through a healing-crisis, to which I have given the term of Woollen System crisis.

These Woollen System crises are a more or less regular occurrence in the cure, through the Sanitary Woollen System, of all diseases and of all tendency to disease which are due to the storing-up of a disease-matter or of matter disposing to disease; and whereas the fact of the crisis making its appearance is, for those who really understand the subject, the first gratifying sign that the cure is possible, and has begun, these crises, which run their course like actual diseases, are unfortunately often enough made an occasion by unintelligent or malevolent persons to denounce the Sanitary Woollen System as an imposture, or as actually injurious. The comprehension of healing-crises, which

thus forms a central point for an understanding of the whole question, is by no means so general as it should be, and I will therefore here relate from my experience the essential facts.

I must premise what everyone probably knows who has completely recovered from an illness: whereas before the outbreak of a feverish disease he had a feeling of diminished working power and appetite, and, at times, of langour or of minor local disturbances, indicating that there was "something wrong with him"—after the illness is over, *i.e.*, when the disease-matter which was in him has been entirely expelled, without injury to the mechanical portions of the body, he feels that he is healthier than before the actual illness began, in short that the "something wrong with him" has been thrown out. It follows from this that every inflammatory, *i.e.*, feverish, disease which is characterised by violent symptoms is a healing-crisis, which, if not interrupted or checked by faulty and injudicious treatment, frees the patient from chronic valetudinarianism, and may therefore be regarded as a healing-crisis brought about by the healing force of the patient's own nature*. Such crises appear whenever a chronic disease is cured by medical treat-

* This also applies to the febrile infectious diseases. Here the disease germs constitute the decisive impulse for the healing-crisis, but also, certainly, an aggravating impulse, in that the healing-crisis is complicated with a fresh illness, in which the specific secretions of the disease-germ form the poisonous element. This complication makes the disease much more serious, and enhances the danger of after-diseases, because three things are requisite to a complete cure: first, the expulsion of the stored-up matter which disposes to disease (self-poison); second, the expulsion of the specific secretions of the disease germ (extraneous poison); third, dissolution, destruction, and removal of the disease germs which have settled in the body. (In some cases restoration of destroyed tissue is also necessary.)

ment; but the Woollen System cure differs from other methods of expelling disease in that the crisis caused by it is prompter, sharper, and more violent, which is simply the consequence of its greater expelling force, and therefore a proof that its healing power is superior to that of other methods of expulsion. This is of course an advantage, but when the body is heavily charged with disease-matter, and the organism is weak, there is also the danger above described,* that the crisis may prove too vehement for the strength of the patient. I therefore recommend weakly persons not to adopt the Sanitary Woollen System at once in its entirety, but gradually, in the manner described in Part III of this work; and further to prelude it with, for instance, a few sweating-baths, or a fortnight's change in pine- or sea-air. If the necessary caution be exercised in this respect, all danger of too violent a healing-crisis is removed.

The symptoms presented by the healing-crisis are as various as the diseases themselves, but nevertheless some general description may be given.

1. They are always characterised by more or less distinct acts of secretion, oftenest through the skin, either in the form of a simple breaking forth of an intense odour, or of effusion of perspiration. Either the perspiration straightway evaporates, or is so charged with matter that a portion lodges in the clothing as a viscid or powdery mass, in some cases of so acrid a nature that the clothes under the armpits, etc., are corroded, although this does not often happen. These skin-secretions are sometimes

* This is in fact the only kind of risk incidental to the Woollen System cure. On the other hand, it is free from dangers which attend other cures, especially the bathing-cure, namely, that through the repulsion of the blood from the skin, the disease is thrown with augmented force into the internal organs.

of short, and sometimes of longer, duration, and are usually accompanied by abnormal feelings of burning, itching, etc., of the skin; in some instances the irritation causes actual eruptions or sores. The feverish symptoms I will deal with further on. Secretions through the other organs occur less frequently than through the skin, the most common among the former being loose evacuations, usually of very offensive odour, or catarrh of the respiratory passages, or in female cases, of discharges of mucus or blood.* Secretions by way of the skin are the most favourable to a cure.

2. One of the commonest features of the healing-crisis is a slight feverish attack, which may extend to actual fever; for instance, in curing a tendency to feverish colds, the crisis always takes the form of an actual feverish cold, which is usually more violent, but lasts a much shorter time, than the patient has previously been accustomed to.

3. When the stored-up disease-matter is the residue of a previous inflammatory illness, which has been incompletely cured and which has passed into a chronic state of ill-health, the healing-crisis assumes the form of this inflammatory disease, *i.e.*, is a repetition of it. For instance, if a chronic chest complaint is the residue of an attack of pleurisy, the healing-crisis will appear as pleurisy; if the complaint dates from a brain fever, this is repeated. In other words, the healing-crisis consists in the retrieval of the incomplete cure of the primary disease, through its repetition.

4 There is a certain connection in point of time between the Woollen System crisis and the period for which the

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* In some cases of persons affected with tubercles on the lungs the healing-crisis took the form of somewhat violent bleeding from the lungs,—in the case of a lady who suffered from tumefaction of the spleen, of an abnormal fluxion, and in some male cases, of hemorrhoidal bleeding.

chronic illness has endured; the more recent the date of storing-up of the disease-matter, the sooner will the healing-crisis set in, and, conversely, the older the chronic complaint, the longer will the crisis be delayed. When there is this delay, the person affected either notices no improvement after adopting the Sanitary Woollen System, which rarely happens, or there is at first an improvement and the patient believes that he is quit of his complaint; from time to time, however, he is gently reminded of it, until one day the healing-crisis breaks out. The period of resistance which the disease-matter, prior to the outbreak of the crisis, offered to the Sanitary Woollen System entails a proportionately longer duration of the crisis when it is in progress; and frequently the crisis is divided into light preliminary crises, a heavy main crisis, and one or more light after-crises. The appearance of more than one crisis is generally due to the patient having suffered from two or three inflammatory illnesses with subsequent chronic ill health. The first crisis then repeats the latest illness, removing the residual disease-matter thereof, and the following crisis repeats the earlier illness; in short, the residua of disease are expelled in the reverse order to that in which they were acquired.

Here we can discuss the question whether all diseases can be cured by the Sanitary Woollen System, which must be answered in the negative. What I stated on page 103 as to the curability of diseases in general is here applicable, and there is a special limitation to be made to the powers of the Woollen System cure. In the natural scientific explanation of the relation of clothing materials to the exhaled matters of the body, it was said that vegetable fibre attracts the mal-odorous portion (self-poison) of these matters, while wool attracts only the fragrant portion (self-medicine), allowing the self-poison to escape. This

statement, as regards wool, requires modification. Under the expression "self-poison" is not to be understood a single fixed chemical matter, but a multiplicity of chemical matters of diverse origin, and these we must now distinguish. The preponderating portion, because they are incessantly being formed, are the mal-odorous gases produced by the digestive action of the intestines, which I term the intestinal self-poison. Further, there are self-poisons which are only at times disengaged from certain organs of the body. Such special poisons can originate in any organ in consequence of the latter's excessive activity. Thus in cases of mental chagrin, a mal-odorous poison-matter is set loose whose source is the brain. In the same way there is the self-poison of the lungs, the muscles, the liver, the kidneys, &c. Experience has now shown that fibre of animal wool does not refuse to absorb these various self-poisons in an equal degree. It is least susceptible to absorption of the commonest and most important kinds of self-poisons, namely, those which proceed from the intestinal canal, for which reason complaints of this organ are relatively the easiest to heal through the Woollen System cure. To the female self-poison and that from the brain, woollen fibre is somewhat less indifferent, and diseases connected with these causes do not heal so readily. The most unfavourable results of the Woollen System cure have been in cases of self-poison proceeding from the liver, as shown by the following two-fold experience :—

1. Liver complaints, especially when they are combined with indurations, are either incurable by the Sanitary Woollen System, or at most can only be ameliorated.

2. If the woollen clothing of a person whose liver is diseased be tested by the sense of smell, it will be found to be mal-odorous, in contrast to the absence of odour from the woollen clothing of other sick or healthy people. This

is the case even when the clothing is made of pure, undyed sheep wool or camel hair, and examination with the nerve-measure confirms that it produces a laming effect. Herein lies the reason why certain liver complaints cannot be cured, and it constitutes a valuable proof that the healing of diseases of the intestinal canal, the lungs, &c., through the Sanitary Woollen System is due to the wool not absorbing the self-poison developed in these organs.

Another point in which the cure is not efficacious follows from what was said respecting the Woollen System crises in above paragraph, numbered 4. It was there said that the longer a disease-matter has resided in the body the more its expulsion is delayed. Now that disease-matter has resided longest in the body which was inborn, *i.e.* inherited. I will here adduce my own case.

A portion of my ill health in adult age dated from my youth and subsequently, and from this I have been relieved by the Sanitary Woollen System; but I inherited from my mother tendency to mumps and throat catarrh, which the Sanitary Woollen System could not, in six years, remove. With the exception of a single winter (1883–4), I have been troubled every winter with these complaints, since I arrived at puberty, although, here too, the Sanitary Woollen System has effected a very advantageous alteration. In the years prior to my adopting the System, these complaints always assumed an inflammatory, feverish character, partially ending with suppuration. These characteristics have wholly disappeared; since I have been in the Wool the catarrhs have been slight and free from fever and inflammation, and have so little affected my working capacity that I was more than once able while they lasted to undertake the considerable strain of lecturing tours, whereas formerly I was often confined to bed, or at least was disabled from following my occupations.

As regards the protection afforded by the Sanitary Woollen System against illness, what I said at the beginning about protection generally exactly applies here, namely, that protection is first practicable after completed cure, and, further, that it is not absolute; the fresh influence of self-poison penetrating from without, or of self-poison liberated internally through some exciting cause, disturbs the health even of a Woollener. When, however, in addition to adopting the Sanitary Woollen Clothing, he is able to carry out the other recommendations connected with my System, he is protected from the danger of associating to the aforesaid fresh poisonous influence the fever and inflammation which arise from the liberation of stored-up disease-matter; *he loses the tendency to feverish inflammatory illness.*

As things are now, very few persons are so situated that they can avoid all conditions which may induce storing-up of extraneous or of self-poison; but whoever so far carries out the Sanitary Woollen System as to use Sanitary Clothing and Bedding and to sleep with open window, has the advantage, even when unable to avoid the bad air of schools, workrooms, &c., that the storing-up of poison in his body will not reach the height which is necessary to induce actual inflammatory diseases. He will not escape transitory feverish states, but there is an immense difference between light, quickly passing fever (*febricula* is the technical term), which does not amount to localisation, and an internal inflammatory disease involving several weeks' confinement to a sick bed.

The relations of the Sanitary Woollen System to the health-matter are as important in the cure as its relations to disease-matters, and unfortunately this is the side of the question which is in general least comprehended. There is no reference in modern medical literature to the

fact that human beings and all living creatures produce health-matter.

We have said that cure is effected by expelling the disease-matter, and in this expulsion two factors require to be distinguished. One factor consists in the direct influences already described which external conditions and impellent matters directly exercise on the disease-matter. Volatile matters can also be expelled from a dead body through physical and medicinal means: but if the body itself assists, by enhanced activity of mutation of matter, and of excretion, this assistance is as weighty a factor as the other; and a treatment of cure which stimulates the activity of this factor must surpass all methods of cure which neglect it. Herein lies the chief element of the superiority of the Woollen System cure to every other. Inasmuch as the woollen fibre collects the health-matter of the wearer's body, the healing power of his own nature is thereby vigorously seconded, and at the same time is preserved. This is the reason why the Woollen System cure not only finds, like any other established cure, willing patients, but also enthusiastic and grateful adherents; because after the cure is performed, there sets in a previously unknown condition of vital energy and enjoyment of life. The co-operation of the health-matter explains why, in this cure, the healing crises are so energetic and prompt in comparison with those of other methods of cure. The reason is the enhanced and sustained assistance which the health-matter enables the organism to render in the process of cure; whereas the organism is more passive in the other methods of cure, or is only transitorily aroused.

PART III.—EXPLANATORY OF THE SANITARY WOOLLEN SYSTEM.

XV.—THE SANITARY WOOLLEN SYSTEM.

WHEN I determined, as mentioned in the Preface to this Edition, to study the subject of Health Culture, with the view to restore my own health, the comparison which, as a zoologist, I naturally instituted between the average health of civilized man and that of the animals was very much to the advantage of the latter.

Animals suffer in a greatly less degree than man from a variety of diseases which affect the organs of respiration and digestion, and are usually free from such complaints as gout, rheumatism, corpulence, &c. Yet they are in general much more exposed than man to the influences of wet, cold, and climatic changes. In the course of my inquiry into the reasons for this comparative immunity of the animals from the common ailments of man, the following considerations were impressed upon my mind :—

Nature has clothed the animals. Man clothes himself.

Animal Wool, which Nature has created to clothe the animal body, is the "survival of the fittest" clothing material.

Vegetable fibre (linen and cotton) is not a *natural* clothing material, and is only used as such by man.

Here I had obtained an important clue to the problem which I had set myself to solve, and the further I

investigated and experimented the more clearly I realised the infinite divergence between materials of animal and vegetable fibre in respect of the two primary services which clothing should render to the body, viz :—

To keep the skin *uniformly* warm.

To allow a free outlet for the cutaneous exhalation of watery vapours.

That the vegetable fibre of linen and cotton cannot maintain uniform warmth of the skin is theoretically evident from its readiness to conduct heat, and practically my readers know that it sets up a feeling of chill directly it becomes damp upon the skin.

That linen and cotton hinder, instead of assisting, the passage of the cutaneous exhalation into the outer air is equally well-known in practice, especially to everyone who has worn flannels for athletic exercise, and has contrasted the difference in this respect of animal wool. The linen or cotton shirt quickly becomes saturated with perspiration, and clings to the skin, keeping it wet and chilled, thus repressing the exhalation; while the perspiration passes freely away through pure, porous wool, leaving the skin dry and warm.

The attraction by vegetable fibre of the noxious odours of the body's exhalation is referred to in other portions of this book, especially in chapter 36.

Before I had fully recognised the hygienic value of covering the body solely with material of animal wool, I had arrived at the conviction that much of my own chronic ill-health, and of that of mankind in general, was due to the effects of an accumulation of fat and water in the tissues, as set forth in chapter 7 of this work. This I at first endeavoured to combat, both in my own person and in my recommendations to others, by strenuous bodily exercise, with a view to cause the pores of the skin to

exhale more freely, and thus, as it were, to drain the tissues and harden them. I found, however, that the effects were at best temporary. Every forcible remedy adopted produced a slight diminution in the measurement round the body, but as soon as I ceased the special cure I returned to my former size. Moreover, the strenuous exercise treatment is impracticable in the case of the weakly, the old, and of those who are engaged in sedentary pursuits.

When, however, I recognised that it was possible so to assimilate human clothing to that with which Nature has endowed the animals, as to render it—

Pervious to the skin's exhalations,

Non-conductive of heat, *i.e.*, not chilling,

Closed against draught of air, *i.e.*, protective against local chill,

had discovered the reforms in Clothing and Bedding which are comprised in my Sanitary Woollen System, and I had provided means whereby the tissues may be automatically drained, and *kept drained*, of the excess of fat and water which does so much mischief when its excretion is repressed by covering the body with unsanitary materials.

It is most important to bear in mind that it is not enough to wear wool next to the skin, and any other material over it. If at any point underclothing, or lining, or padding, or stiffening of vegetable fibre, or of silk, intervene between the body and the outer atmosphere, an obstacle is set up to the free passage of the exhalation from the skin, with the result that the noxious portion of the exhalation settles in the vegetable fibre, which consequently becomes mal-odorous; and everything mal-odorous is prejudicial to the health. Moreover, not only is the health prejudiced by even a partial use of unsanitary material, but the feeling of lightness and comfort which ensues when the

body's exhalation can get freely away, preventing the oppressive sensation of heat which is due to its retention, is sacrificed when, for instance, the woollen shirt is covered by a waistcoat which is lined and backed with impervious cotton material.

All material, therefore, manufactured of or adulterated with vegetable fibre should be discarded, whether in the form of underclothing, or of linings or pockets, &c., to the outer clothing. The same principle holds good for the Bedding, as is explained in the chapter devoted to that subject.

Having thus shortly indicated the general lines on which I based my Sanitary Woollen System, I will, before entering on the explanatory details contained in the following pages, make a few observations which will serve as guidance to those who wish to make trial of its benefits in their own person.

The most favourable season for adopting the System is undoubtedly the spring (April to June), but this does not imply that a beginning may not be made at another time of the year.

Healthy, vigorous persons, especially younger people, who feel perfectly well, and have no residue of a previous illness settled in their bodies, can adopt the System in its entirety at any season without hesitation. On the other hand, persons who are sickly and weakly, and whose bodies are charged, or even perhaps saturated, with disease-matter, will find it advisable to adopt the System gradually. This gradual beginning is by many erroneously made with the shirt. It is decidedly better that, of the clothing worn by day, the *outer-clothing* should be first adapted to my System. In the reverse case, even comparatively healthy people, when the skin is sensitive, may at first suffer from itching, while with sick persons Woollen System crises are apt to set in, which are troublesome, because prolonged. As regards the

bedding, the first thing to be changed is the covering, or counterpane; the pillow should follow; then comes the substitution of a woollen material for the linen sheet, and, finally, the woollen mattress. It is by no means necessary to alter everything at once; indeed, when the complaint is of a more grave and difficult nature, and the body is weakened, the adoption of the Sanitary Woollen System by stages is to be recommended on hygienic grounds; as in this way the setting in of severe crises, which might involve danger, will be avoided. A gradual adoption of the System is, moreover, in many cases necessitated by considerations of economy, and the desire to avoid a crisis of a financial nature.

The opinion is not infrequently expressed that the adoption of the Sanitary Woollen System is very expensive; this is a mistaken notion. The first step costs practically nothing. Nearly everybody wears woollen outer-clothing. By simply removing the faulty lining and padding from the woollen outer-clothing,* quite a respectable beginning is made towards adopting the System; and as no woollen lining need be substituted, the coat being left unlined, the question of cost does not arise. The old apparel can thus be altered and worn out; and although this plan does not secure the whole benefits (particularly as regards the question of sanitary dye) of the System, yet, as compared

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* I recommend my readers to perform this instructive operation for themselves, as their eyes will then be opened to the unsanitary nature of ordinary outer-clothing; the commonest rubbish of vegetable fibre is usually employed for padding, and even for stiffening and lining. After a coat has been worn some time, these materials become a perfect Augean stable of evil odours, which are inhaled by the wearer whenever changes of temperature and moisture cause them to be given off, as may be easily proved by damping the material and then passing a warm iron over it.

with the previous clothing, no little progress will have been made.

The Sanitary Woollen System does not develop its full effect at once, but requires time. In the case of sickly adult persons crises often set in at the commencement, which must not be allowed to mislead (*see* page 107). Absolutely permanent health is no more to be expected of the Sanitary Woollen System than is perpetual existence; on the other hand, the experience hitherto obtained justifies the assurance that disturbances to health are much less frequent, and when such take place, although at first violent, they pass much more rapidly, and very seldom merge into chronic illness. Moreover, and this is the main point, when the health is free from disturbance the feeling of health and vigour is such as is almost wholly unknown to those who are not sanitarily clothed.

The Sanitary Woollen System has proved itself to be a powerful means of cure, supplying a distinct gap in the science of healing, and presenting the advantage of a lasting cure for all diseases due to self-poison and to enervation of the tissues, as already explained. That it should be adopted with intelligence has already been pointed out, and those who desire to apply the System to healing purposes should be guided by the information conveyed in my book, or should consult myself or some other physician who is intimately acquainted with the working of the Sanitary Woollen System.

Before adopting the System it will be well to take some Russian or Turkish baths, for the body is thereby drained of water, and is also deodorised, as odorous matters are removed with the water eliminated by the pores, and thus the way for the System is paved. On each occasion after the bath, bath-oil should be rubbed into the skin (*see* chap. 42).

The course which should be pursued in reference to

bathing by those who are in Wool, and who have been cured by the System, may be seen in the chapters on "Bathing." I will now discuss the separate articles of clothing, etc., in connection with my System, in their order, proceeding from the foot to the head. I shall mainly deal with men's clothing, as most requiring reform, and will afterwards mention ladies' and children's clothing, in so far as it differs from men's.

XVI.—THE STOCKING (OR SOCK).

THE proper covering of the foot is of great hygienic importance. This is expressed in the general dread of cold feet—*i.e.*, of the withdrawal of blood from the feet—and is fully justified by the part played by the feet in the distribution of blood in the body. The first consideration in properly clothing the foot is the stocking (or sock).*

The material should consist of wholly undyed sheep or camel wool. Having regard to the great importance of the flow of blood in the skin of the foot, no other material is suitable, and precisely those who are otherwise Woolleners should least of all wear stockings of vegetable material; it is also evident that the considerable exhalation from the foot renders unsanitary dye in the stocking especially injurious, as ample experience has fully established. It is further important that the stocking be roomy (Compare what is said on this point with respect to the shoe), soft, and pervious. In order to maintain these qualities in the stocking, it is necessary that the instructions as to washing (see remarks on this subject) be carefully observed. A

* The stockings may be long or short, but in the former case they should never be kept in place by tightly fitting garters.

woollen stocking which is wrongly handled shrinks, and when made of strong wool becomes as hard as a board and an instrument of torture for the foot, especially for the toes. Under such conditions the skin must necessarily suffer from perspiration, pressure, and evil odour. I particularly recommend those who have sensitive feet, and indeed everybody, to use the toed-stockings—*i.e.*, stockings provided with a separate receptacle for each toe, like the fingers of a glove. The objectionable condition of the skin between the toes, which no amount of cleanliness and care can wholly avert, and which frequently causes soft corns, and even sores, is due to the inability of the perspiration to escape when the surfaces are in contact. The interposition, in the five-toed socks, of a layer of woollen material between each toe absorbs the perspiration and rapidly effects a remarkable change. The skin between the toes becomes dry and wholesome, soft corns disappear, and the squeezed, crippled appearance of the toes greatly alters for the better.

The toed-stockings require to be of somewhat thinner material than ordinary knitting wool, because otherwise the toe receptacles would be too clumsy ; and they must also be roomy, to avoid the danger, in case of their shrinking through bad washing, of the use of too much force in drawing them on, which injures their durability. The toed-socks are especially recommended to persons who suffer from perspiring feet, and their value has been gratefully recognised by many people.

I take this opportunity to interpolate a few words respecting the treatment of perspiring feet. Whoever suffers from this troublesome complaint should, of course, wear sanitary woollen stockings and shoes, and should from time to time wash the feet in cool water (REGLIN Essence added to the water improves the effect), and should afterwards well rub in REGLIN Bath-Oil. Of course the stockings

must be frequently washed, which if done at not too high a temperature, and without rubbing, so far from injuring them, improves the texture. In the shoes should be moveable woollen soles, which may be occasionally washed. So long as these are free from odour the foot is also free, and the stocking. This method involves no suppression of the perspiration, which would be distinctly injurious, but causes it to more freely evaporate, so that it does not become mal-odorous, while the skin is so strengthened that the corroding action ceases.

XVII.—THE BOOT AND SHOE.

THE disregard of sanitary considerations in the material and construction of ordinary clothing is especially remarkable in the matter of the covering of the feet. It is true that remonstrances have at times been heard against the senseless fashion of narrow pointed boots, which so squeeze and distort the foot as in some cases to force one toe over the others; and high heels have been freely denounced. But the efforts of reformers of our boots and shoes have been almost exclusively devoted to the *shape*: the *material* has escaped their observation. Yet it is to the material of the boot that much of the misery which so many victims suffer with their feet is due, as a very little consideration of the matter will serve to show. The feet are as sensitive, as much composed of flesh, blood, and porous skin as any other part of the body; but who would dream of clothing any other portion of his frame in impervious leather, which is frequently saturated with the moisture exhaled from the skin, and is never washed? The burning, swelling, and other uncomfortable sensations of the feet in summer, and their icy chilliness in winter,

proceed from the same cause—viz., the improper material with which they are covered. Imprisoned in impervious leather, the feet cannot, so to speak, *breathe*, but remain bathed in the exhalation and moisture which they so freely secrete through the pores, and which cannot escape. Hence the mal-odorousness of the ordinary boot, which amounts to a positive nuisance in cases of people who are said to suffer from "perspiring feet," notwithstanding every precaution of cleanliness. Obviously no boot, however anatomically correct its shape, can claim to be really sanitary or hygienic unless it permits the foot to "breathe."

In this respect wool is the most suitable material, in so far as it can be used, and boots made entirely of wool are absolutely the healthiest of foot coverings. That such entirely woollen boots are possible, not merely for indoor wear, but for walking, is proved by the fact that in many Slavonic countries and in China such shoes are continually worn through dirt and dust, in summer and in winter. In view, however, of the objection that boots made entirely of wool will not satisfy modern requirements as regards elegance and solidity, it is interesting to consider how far other materials may be used conjointly with wool in making boots which deserve the title of sanitary. Of such other materials tawed leather is from a sanitary point of view undoubtedly the best. In the form of buckskin it is used for hunting-breeches and driving-gloves in England, and in Germany for the breeches of the peasants. Unfortunately, tawed leather is only really suitable for the purpose when made from the skin of the wild deer, as when made from the skin of domestic animals it is soft and spongy. It naturally follows from the scarcity of the wild animals whose skin is alone suitable, that tawed leather, fit for use in boots or shoes, is very expensive. A further

disadvantage of tawed leather for this purpose is that it soon becomes dirty; but unlike wool, from which dirt can be brushed, tawed leather can only be cleaned by washing, which, if done carelessly, renders the leather afterwards hard and stiff. The mocassins of the Indians in North America are made entirely of tawed stag's leather, and to this fact may perhaps be attributed in some degree the swiftness of foot for which they are remarkable.

On the whole, however, tawed leather cannot be considered as practicable for use in boots which will be generally acceptable in respect of durability, elegance, and cost; while the material which best satisfies these requirements is tanned leather, which is nevertheless hygienically bad, because, as ordinarily used, it is impervious to the exhalation of the foot, and becomes mal-odorous.

These objections can, however, to some extent be remedied. Boot leather has an upper, grainy side, on which the hair of the animal grew; and a lower side, which covered the animal's flesh. The upper, grainy side is composed of numerous minute vessels, which the position of the skin on the animal tended to expand; while the texture of the lower, flesh side is closer and harder. It is the common practice to reverse this position of the skin in boot manufacture, with the result that these vessels are contracted and that the leather loses its natural porousness. The effect of the confined perspiration on the grainy part of the leather thus placed inside the boot is to cause it to decay, and when a boot has been worn some time the interior portion of the leather becomes rotten. Thus we have another instance in which the natural excellence of a material, and the hygienic considerations connected therewith, are habitually sacrificed without any adequate compensating advantage. Appearance and fashion are considered to wholly outweigh health and comfort. Tanned

leather can be further improved by washing out the residue of the tan with soda, and by saturating the leather with vaseline, which is the only grease which will not turn rancid. Leather thus treated becomes odourless, but only so long as ordinary blacking is not applied to it. Unfortunately, vaseline tends to close the pores of the leather, and if a boot or shoe were made entirely of vaseline leather the egress of the foot's exhalation would be checked to a serious extent; nevertheless a shoe of this kind would be incomparably more agreeable and healthy than one of ordinary leather. To make the shoe as healthy as possible, and yet in harmony with modern requirements as to shape and durability, wool and vaseline leather may be used conjointly, so that the sole and equipment (or golosh) are made of tanned leather, while the upper parts and the linings, as well as the socks, are of woollen material. Woollen stockinet or tricot cloth is very suitable, both for outdoor boots and for house shoes and slippers. The use of the woollen movable socks already referred to is very strongly to be recommended; and these should at times be changed, so that they may be purified and refreshed by exposure to sun and air.

The boots should be roomy, to prevent the toes from being squeezed together, and should be so made that the big toe is not pressed against its neighbour, but is encouraged to lie in a straight line drawn from the heel to the root of the great toe. The heel of the boot should be low and broad. If there are no special reasons to the contrary, arising from road or weather, low shoes should be worn, as they afford additional facility for the exhalation of the foot to escape, and at the same time strengthen the ancle, by depriving it of an artificial support which in reality interferes with its free action.

The most varied forms of boots and shoes, suited to

different requirements or tastes and conditions of road or weather, can be made in accordance with the above principles. Slippers for indoor use, low shoes to lace or button for summer and dry weather (these can be made either entirely of cloth or with a leather equipment); higher boots of cloth, to lace or button, with or without leather equipment or golosh, and with thick soles for very wet weather, shooting, etc. A change of shoes is desirable, even from an economical standpoint, and it is certainly best to have a variety corresponding to and fulfilling various needs, from a shooting boot to a ball shoe.

It should be remarked, however, that woollen boots and shoes without any leather equipment are perfectly suitable and safe for wet weather; in some countries woollen shoes are always worn, and I have tested them myself thoroughly; the wetting of the wool does not chill the feet, the heat of which promptly evaporates the moisture from the covering, which therefore soon dries. Those, however, who for various reasons may deem woollen boots unsuitable will derive great advantage both in health and comfort from adopting shoes with woollen upper parts and linings, and vaseline leather equipment and sole. To clean the vaseline leather it is only necessary to use a sponge and cold water; no blacking should be used, but the leather should from time to time be refreshed with the sanitary dressing, which preserves the leather, and prevents it from becoming hard and stiff.

It is quite a mistake to suppose that the woollen cloth (or cloth and leather) boot with woollen lining is "hot." If the feet can exhale through their covering they will keep comfortably cool; while the non-conductive nature of wool retains the natural heat of the foot in cold weather, and protects against that direst of discomforts—cold feet, an additional cause of which is the mal-odorous nature of the

ordinary boot, on the principle elsewhere explained in this book. It is of great importance that the cloth and lining material should be either undyed, or be treated only with dyes of a sanitary nature.

A notable feature in the sanitarily-constructed boot is the patented construction for ventilating the sole of the foot. The woollen boot-sock rests on a *perforated* leather inner-sole, beneath which a piece of pure woollen-felt extends the entire length of the boot: through this woollen material the exhalation can pass away, by means of an outlet to the open air provided in the heel of the boot.

XVIII.—TROUSERS OR BREECHES.—I.

THE indignant contempt which I have long felt for the mode in which men are condemned by modern artificiality to clothe their legs has been accentuated by reading a pathetic account of a ball lately given by students at the Tübingen University. It appears that a large number of the ladies present were forced to sit inactive, not because there was a lack of men, but because the men lacked inclination to dance. The contrast between the general inclination of maidens to dance and the frequent disinclination of the other sex, must have some other and deeper foundation than that modern young men are wanting in the necessary good will and sense of duty. I am strengthened in this belief by observing the effort which it costs even the ardent and practised male dancer to keep pace in point of endurance with ladies who are fond of dancing. I maintain that, given equally good constitution and health, every lady can wear out her partner, and the reason of this (for men) ignominious fact, is that the costume of males is much more prejudicial to the physical energy and power of performance, and therefore much less healthy than that

of females. It completely reverses in this respect the normal relation between the stronger and the weaker sex, and I propose in the following comparison between male and female costume to make this clear.

To commence with the colour: the contrast, particularly in dancing assemblies, is most pronounced. The female dress is of white or some other light colour, while the men adopt the unworthy, laming, energy-destroying hue of mourning: thus the costumes of the two sexes are as different and as little in harmony as black and white. There are, however, different grades of male dancers, and the odds are great that if one be found who dances gaily through the whole programme without sign of fatigue, he is a soldier, clothed in his indigo blue, red, or white uniform. I may here refer to the experiments recorded in Chapter 37, showing the effect of various-coloured clothing on the running powers.

The second reason I consider to be the manner of clothing the legs, and this is very important. The long dress, reaching nearly to the ground undoubtedly constitutes an impediment to movement which places women at a disadvantage compared with men; and if, notwithstanding, the former are more active dancers, the importance of properly clothing the legs becomes additionally clear.

Apart from the petticoats, the female lower limbs are clothed in drawers terminating at the knee, close fitting stockings, and low shoes, in fact just as the male legs were clothed up to the present century, and are still clothed in the Tyrol and in the higher parts of Bavaria; and as has of late years again come into vogue for tourists, cyclists, and others who strenuously exercise their legs. Those who adopt this costume are well aware that it imparts to the legs very different powers to those conferred by the modern trouser.

Let us briefly examine the history of the trouser.

We know from pictorial representations of the time of Charlemagne that the covering of the legs was then wide, but was bandaged round the leg from below up to the knee, thus preventing the current of air which ascends the open channel of the modern trousers, with most prejudicial effect to the legs.

To this costume, which is found at the present day among the Italian Pifferari, succeeded the tight hose of stockinet, fitting closely to the entire leg, like an elongated stocking, and forming a main feature of the beautiful costumes of the Middle Ages. These are the costumes which now-a-days we can only platonically admire and envy, when we see them in the theatre or the circus, where the foot-athletes *par excellence*—the rope-dancer and the acrobat—wear them; but we draw them from their hiding-places again whenever, as on the occasion of historical processions, fancy-dress balls, &c., we are possessed with a thorough spirit of festivity and joy in life, and try to feel that we are indeed made in God's own image, in contrast to our miserable, every-day condition, in which we appear as an artificial product of the tailor's cunning. The joy in life and pleasure in the dance which characterised the whole mediæval existence, are inseparable from the dress of those times. One must see the Czardas dancer of Hungary, who still wears the mediæval tight hose, if one would realise how, in the Middle Ages, the drinking-cups came to bear the device:

> "*Tanzen und springen gefällt von allen Dingen.*"
> (To dance and to spring is the pleasantest thing.)

Which now-a-days might be altered to—

> Idle sitters glasses fill
> For the sake of sitting still.

When the Thirty Years' War suddenly extinguished the joyousness of the Middle Ages, the tight stockinet hose had come to be divided into two parts, knee breeches (*culotte*) and stockings. This was, hygienically, a retrogression, because the knee breeches soon came to be worn wide, and in consequence were unsanitary; moreover, the garter and the overlapping of breeches and stocking impeded the equable distribution of blood in the leg. Still, the wearer of the culotte was much more hygienically clothed than the *sans-culotte*, who first appeared at the time of the French Revolution. This title was given to the men who discarded the culotte, then in general use, in favour of the sterotype trousers of the stage fool—Pierrot, or Pantalone, as he was called in France or Italy—and hence the term pantaloons for trousers, which endures to the present day.

Is it not an ignominy, particularly to the Germans, that they should have sacrificed their noble mediæval costume to the sans-culottism which sprang from the eccentricity of the French Revolution? After the adoption of the sans-culotte trouser the mode of shoeing the feet quickly became spoiled. Until then the low, light shoe was generally worn, and although it was of leather, it gave considerable opportunity to the foot to exhale; but such shoes soon proved incompatible with the trumpet-shaped trouser. It was found that the current of air drawn up the trouser-legs chilled the knees and ankles, and to remedy this the boots were made to reach higher and higher, until they covered the calf inside the trouser, thus depriving the foot of all facility to exhale, with great detriment to its condition and capability. Nor is this all: as not even the high boots could altogether prevent the disagreeable draught of air, drawers were invented, whereby the proper exhalation of the whole leg was impeded, which means decreased strength and shapeliness of limb To the mediæval dancing and

springing succeeded a dull inertness, and the form of "God's image" came too often to resemble that of a toad with protruding stomach and rickety legs.

This alteration in the shape of the body occasioned a fresh departure. At the beginning of this century the pantaloons were still quite narrow, but the protruding stomachs and weedy legs made such trousers impossible, and thus arose the present loose shape in which, despite high boots and drawers, the air so circulates as to drive all the noxious exhalation of the body through the clothing out at the aperture at the neck, where it is inhaled.

Women have kept apart from this senseless fashion, remaining true to the culotte, the long stockings, and the light, low shoes, or at least the laced shoe ; and thus, notwithstanding their long dresses, they can dance and spring with the endurance of a Tyrolese.

It is interesting to complete the comparison between the modern dress of men and women. Women have a further advantage, in that they make a practice of girding the loins. (See "Girded Loins," Chap. 48.) Moreover, the female outerdress usually fits closely, so that the clothes-atmosphere cannot ascend and infect the air inhaled ; the sleeves are generally narrow, and when fashion has occasionally misled women to adopt wide sleeves they have always quickly reverted to narrow sleeves again.

Another advantage is the far thinner, and therefore much more pervious, fabrics used for women's dresses, compared with the stuffs, often of almost elephantine thickness, worn by men. The continual increase in the thickness of men's tailoring materials cannot be sufficiently reprehended ; it finds ready support from some cloth-makers, for the thicker the material the more shoddy can be worked up in it. This is a point on which I am continually insisting with the authorised makers of Men's Sanitary Woollen Outer-clothing,

and I take the opportunity to ask adherents of my System to support me in my contention—which is in their own interest—by energetically refusing these elephantine hides, and insisting on having porous materials. Female clothing is thus hygienically better than that of men, and that it is much more tasteful than the latter, which at the present time seems to have reached the acme of tastelessness, cannot be disputed. What I, however, wish to lay particular stress on is, that woman is the mistress of fashion, while man is its slave. Woman never submits long to a fashion, but throws it on one side when it ceases to please or suit her. Man, on the contrary, declares every divergence from the once dominant fashion as "impossible." How much has been written by men against the swallow-tail coat and the tall hat! Yet to every suggestion that they should give practical expression to these views, the answer is, "It can't be done; it really can't be done."

Artists are unanimous in condemning the modern male costume, which they never paint unless historical truth requires; they confine themselves to painting antique or Renaissance, or culottist costumes, the last-named being drawn either from the previous century or from the modern wearers of the culotte, *i.e.*, they paint the national costumes of the mountain dwellers. If, however, an artist were urged to break with the modern trouser costume in his own person, and to adopt that which he paints, I believe that he would rather be bled to death.*

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* A singularly close confirmation of these remarks is afforded in Lord SALISBURY'S speech at the Royal Academy Banquet, on 30th April, 1887, where he said: "Then consider the costume of the period. Dresses seem to have been selected by the existing English generation with a special desire to flout and gibe at and repudiate all possibility of compliance with any sense of beauty. I am taxing my

In these later days the tendency to the Renaissance may be traced through all industry and handiwork, and in the style of architecture, of furniture, of ornament, of art in general. In the midst of this revival of taste, man in his black coat, tall hat, and trumpet-shaped trousers stands wholly incongruous, and rendered more hideous by the contrast with his surroundings.

If we thoroughly realise the actual facts, and then consider that this figure of woe claims to be the "lord of creation," we shall be in doubt whether to weep or to laugh. I almost despair of the men, and therefore close these remarks with an earnest appeal to the ladies, in the hope that they may succeed in inducing their mankind to adopt a more sensible, healthy, and tasteful costume.

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memory, but I cannot remember any sculptor who has been bold enough to give a life statue of any English notability in the evening dress of the period. (Laughter). I am quite sure that if that man exists he must be strongly tempted to commit suicide the moment his work appears. (Laughter.)"—Ed.

XIX.—THE TROUSERS OR BREECHES.—II.

IF the relevancy to Health Culture of the æsthetic considerations adduced in the last chapter be questioned, I would say that the connection between them is much closer than is generally supposed; although a more practical reply would, perhaps, be, that attention is often more easily won to æsthetic objections to dress than to those which are based on the laws of hygiene. But the case of that unæsthetic monstrosity, the modern trousers, is still worse when viewed from the sanitary standpoint. By leaving the legs too cold, while keeping the abdomen too warm, *i.e.*, by causing a faulty distribution of the blood, and, consequently, an unequal nourishment of these parts of the body, the modern trousers are responsible for the sparrow-like legs and protruding stomachs, which are so common with men, and for the frequent inability or disinclination to walk, run, or jump, as well as for the too common predilection for sticking indoors; further, they are a cause of the hemorrhoids which set in when the first vigour of youth has passed away, and which are not only exceedingly troublesome, but also a source of weakness. In the reform of men's clothing the abolition of the roomy trouser should play a principal part, and the greatest energy should be directed to effecting this abolition.

As regards the material from which the breeches (as I prefer to call them, to convey the idea of trousers fitting to the shape of the leg) should be made, it, of course, follows from what has already been stated, that wool must be employed, and in the first rank stands undyed wool; in the second, wool dyed with indigo. It is manifestly especially important that the breeches, which both above and below are in contact with portions of the body which freely

exhale, should strictly conform to the Sanitary Woollen System, both as regards material and dye. I especially recommend that the breeches should be manufactured of stockinet cloth, or of knitted material, whereby the free movement of the legs suffers no impediment, while the garment may fit closely to the shape. The exhalation passes freely through such porous material into the outer air, and no channel is afforded for the ascending current by which, in the modern trouser, the air is conducted from the feet to the body through the loose clothing, arriving at the outer air in dangerous proximity to the breathing organs.

The hygienically correct ideal would be breeches of stockinet cloth, fitting closely to the shape of the leg, such as were worn in the Middle Ages, not flapping about the boot (or shoe), but, on the contrary, enclosed by it. This form is much preferable to knee breeches, because at the point where the breeches and stockings meet, there is, in comparison with the other portions of the leg, an unequal distribution of blood. If the lower end of the knee breeches is fastened tightly, the blood is congested; while if the end is left loose, it becomes an air-shaft. It is also important that the breeches should so close in front as to provide a twofold covering for the stomach and abdomen, to ensure the proper distribution of the blood (see page 146). This is indispensable for persons who are sensitive in that quarter, or whose digestion is disordered; and it renders good service in dispersing superfluous fat in the region of the abdomen. The sorry shape, unworthy to be presented to public view, of the legs of the majority of men of the present day, will be quoted as an argument against the adoption of my ideal Breeches. To this objection, which is not based on any defect in my clothing system, but on the personal defects of the lords of creation, I reply,

first, that the legs will greatly improve when encased in hygienically correct breeches; second, that if the close-fitting breeches came to be generally worn, the eye, which, by continually looking on the elephantine trouser, distended by drawers worn beneath, has been perverted into demanding an exaggerated thickness of leg, will become more moderate in its requirement in this respect. Moreover, for those whose legs will not even satisfy a moderate requirement of shapeliness, or who on account of their social position, and for other equally well or ill-founded considerations, cannot or will not adopt the close-fitting breeches, there are various expedients, which, however, are hygienically and æsthetically inferior. One such expedient is to hide the lower extremities of the close-fitting breeches by long boots, reaching to the calves, whereby the lower parts of the legs and the feet must suffer; as, in order not to appear remarkable, the boots must be of leather, which has probably been rendered impervious with boot-polish. Another expedient is gaiters reaching from the knee to the shoe, over which they fall in the form of the modern trouser. A third method is the trousers worn by officers of the army, which fit closely to the leg, as far as the calf, and are fastened by straps under the boot. A fourth plan is a somewhat wider trouser, inside the legs of which webbings are sewn, fitting closely to the limb, and preventing upward draught of air. None of these experiments is equal to the simple close-fitting Breeches, because either the covering of the foot and lower leg are not hygienically correct, or the loose trouser-end flapping about over the shoe or boot constitutes a trap for dust and mud, which, from the point of view of cleanliness, must be condemned.

The porous stockinet cloth is hygienically best for Breeches, but one disadvantage of this material must be men-

tioned, for which there is fortunately a thorough remedy. Stockinet cloth acquires a shiny surface where it is exposed to wear, and is apt to warp, particularly at the knees. Both these inconveniences can be remedied in the simplest manner, by drawing the garment, when it has been worn for some weeks, through lukewarm water, and brushing up the shiny places while it is still damp, so that the nap of the wool is restored from its compressed state. This causes the meshes to close together, and the unduly distended parts to contract; the garment becomes firmer, more wear-resisting, and again presents a good appearance. This manipulation is further a gain in the direction of cleanliness, and should never be omitted with breeches of stockinet or knitted material.

The question whether it is desirable to doubly clothe the legs, *i.e.*, to wear drawers or pants underneath the breeches, is referred to in the chapter on Underclothing.

Mention should be made of the pockets. These are always a difficulty both hygienically and technically. The breeches should have four pockets, one on each side in the recess between the thigh and the trunk, not too large in size; then on the left side, somewhat in front, in the neighbourhood of the left hand pocket, there should be a narrow pocket for the watch; lastly, fairly high up on the outer side of the thigh, a narrow pocket for the knife. In this position the knife is best secured from rust through perspiration, and this precaution is more necessary with a Wool-wearer than with persons unsanitarily clothed, as the former's skin exhales more abundantly. Further reference to the subject of pockets is made at the end of the chapter on the Coat.

Something should be said at this point as to the contents of the pockets, for although the statement may appear exaggerated to those who still use unsanitary impervious

clothing, the discomfort of an impervious, and possibly mal-odorous, substance in the pocket is distinctly felt by wearers of porous woollen clothing. The allegation that such increased sensitiveness is inconsistent with the "hardening" effect which I claim for my System is unfounded. When I say that the Wool-wearer is proof against all sorts of noxious influences, I do not assert that he is indifferent to them; on the contrary, the fineness of (physical) feeling which the Wool-wearer acquires re-acts against such influences, and teaches him to avoid them so that they cannot injure him. The question of the handkerchief is dealt with in a separate chapter, and I refer here chiefly to such articles as the purse or letter-case. The purse should be either of wash-leather or knitted of wool, and in both cases is better undyed. The letter-case should be either dispensed with, or made as small as possible, and banished to the tail pockets of the coat, where it acts least as a hindrance to the escape of the skin's exhalation. The Breeches should be kept in place either by a Belt (see the chapter "Girded Loins") or by Braces. As unsanitary Braces speedily become mal-odorous through the exhalation and perspiration of the body, and are a distinct source of discomfort to those who are otherwise clothed in wool, Sanitary Woollen Braces are constructed which possess the hygienic advantage of remaining free from odour, and are not felt to be oppressive and heating over the woollen underclothing.

XX.—THE UNDERCLOTHING.

SHIRT. COMBINATION. DRAWERS.—In striking contrast to the difficulty in introducing to general use some parts of the Sanitary Woollen Clothing, such as the Breeches, is the ease with which this has been effected in the case of the Sanitary Woollen Shirt, that oldest and most powerful

pioneer of the Sanitary Woollen System. The immense number of friends which this Shirt has won for itself renders its recommendation almost superfluous, but the completeness of this work, and common fairness and gratitude, require that some space be devoted to it.

The material, as has been already set forth in detail, must only consist of animal fibre. Sheep's wool is especially suitable for Shirts ; camel hair (see Chapter 47) is much less durable, owing to the excessive fineness of the texture. Very important in connection with the Shirt is the question of dye. Varied experience referred to in Chapters 37 and 38 has led to the Sanitary Woollen Underclothing being manufactured almost entirely of natural colour (*i. e.* undyed). Exceptions are only made when here and there some other shade is insisted on, in spite of all explanation as to the hygienic inferiority of artificially coloured garments.*

As regards the nature of the web, I decided for several reasons, after careful and repeated trials, for Stockinet, which is more porous than flannel (although it must not be too porous and light, like most of the goods made in imitation of the Sanitary Woollen Underclothing, as then it shrinks very much). It is also more supple than flannel, and therefore more durable, and is more agreeable to the skin as it does not become knotty, while it is much less liable to shrink. This Stockinet is manufactured in heavier winter qualities and lighter summer qualities. Very important in the Shirt is the double thickness at the breast (compare page 146). This should not be considered as the mere riding of a hobby. As long as the coat is worn buttoned up and double-breasted, the double thickness of the Shirt over the breast could perhaps be dispensed with ; but the situation is completely changed directly the coat

* To this may be added that natural coloured woollen garments have distinctly less tendency to shrink than when the material has been chemically treated, either by dyeing or by bleaching with sulphur.

is removed or even unbuttoned. The necessity to remove the coat does not only arise when the weather is sultry, or in the case of strenuous bodily exertion, gymnastics, &c., but daily on going to bed; and when in bed the body, unless completely enveloped in the bed coverings, is practically without a coat. In a day- or night-shirt of ordinary construction, *i.e.*, which is not of double thickness over the breast, and which opens in the front, the body is unsanitarily clothed, the blood recedes from the skin, and a condition is established under which more or less severe illness may ensue. The Sanitary Woollen Shirt is closed by buttoning on the shoulder. It could not close on the breast for sanitary and technical reasons, while the plan of closing at the back has been rejected because of its inconvenience.

In the Sanitary Woollen Shirt the body is correctly clothed, even without the coat, and is sufficiently protected under very trying conditions, as I have established by several venturous experiments.

I also adopted this construction in the interest of ladies and girls, as the female outer dress is so greatly subject to fashion, that the principle of double thickness over the chest can sometimes only be carried out by means of the under-garment; in connection with this I may mention that a special garment is constructed for mothers who are nursing.

Pants or Drawers.—Drawers are under certain circumstances a necessity for men, as in the case of elderly men requiring extra warmth, or of those who suffer from abdominal complaints, or of very thin men; but even when Drawers are a necessity they are none the less a necessary evil. Close-fitting Drawers underneath trousers which do not fit closely are not hygienically so good as close-fitting Breeches without Drawers. It is true that the deleterious consequences of the current of air which ascends by the leg are diminished by Drawers, provided that the latter fit

closely, in that the current is at least prevented from passing directly along the leg, which is therefore not so much cooled thereby. But the ascending current is only weakened in its injurious effect; it is not arrested, as it finds ample space and opportunity to move between the roomy trouser and the Drawers. In addition, the advantage cited above is at least counterbalanced by the circumstance that the exhalation from the lower parts of the body is impeded by the excess of covering. The Drawers cover the folds of the shirt, and the trousers cover the Drawers, which is then too much of a good thing, especially where the exhalation is greater than in any other parts of the body.

This led me to cause a Combination of Shirt and Drawers, in one piece, to be constructed; and as it was impracticable to make such a garment to button on the shoulder, like the shirt, a somewhat different plan had to be devised, retaining the principle of double thickness over the chest.

For the reason given above, the Combination garment is better than Chemise and Drawers for the female sex. One reservation must, however, be made as to the use of Combinations, which are not convenient for persons of fleshy habit; in such cases, where Drawers cannot be dispensed with, they had better be worn separated from the shirt, which should not be unnecessarily long.

A simple plan for men, which has been found to work well when Drawers have been dispensed with, is to draw the hinder part of the shirt through the legs and fasten it to the front part of the shirt, with a safety pin.

The remarks respecting material, web, and colour of the Shirt apply equally to the Pants (Drawers) and Combinations. In both the latter the middle line of the stomach is doubly covered, on the principle explained on page 146.

I must here refer to the objection which is sometimes

made that the Sanitary Woollen System is enervating. For instance, HUFELAND, who in other respects expresses himself as exceedingly favourable to animal wool as a material for clothing the body, says: "But it (animal wool) may do harm to all such persons as have a natural tendency to very abundant perspiration, and are still at a time of life at which they may hope to be cured of this complaint; also to those who have naturally a considerable superfluity of animal electricity, vital energy, and heat; also to those who are not in a position to change this clothing frequently, or to put on fresh clothing at least once a week or once a fortnight; all such persons I would dissuade from using wool, which is very injurious when young people clothe the lower limbs in it. But in cases where it is beneficial I recommend that only woollen material be taken, and that it be not too rough, too thick, or of porous web. On the whole, I believe that it would not be good if the practice of clothing the skin in wool were generally introduced, at least I would never accustom a child or young person to it."

Thus far HUFELAND, to whose reservations I subscribe word for word, *provided that outerclothing of mixed material and not absolutely pure wool be worn over the woollen underclothing.* In such case wool certainly enervates, and entails other injurious consequences, as will appear from the following.

The woollen shirt induces a stronger suffusion of blood in the skin, and thereby enhances the skin's exhalation; but as this settles in the unsanitary linings of the outer clothing, rendering them damp and mal-odorous, the atmosphere of the clothing acquires a high degree of dampness, and an offensive condition. The skin is, as it were, surrounded by a damp atmosphere, which enervates it and makes it very susceptible. This sets up a greater

pressure of blood to certain parts, increasing the sensibility of the skin, and, therefore, its irritability. All this is changed when the outerclothing is wholly of wool; the exhalation then passes freely away, and the skin remains dry, and hardens; for desiccation implies hardening, and saturation implies enervation. These are the reasons why my system of pure woollen clothing has achieved such brilliant success with children and young people, and in cases of eruption of the skin, &c., so that I can conscientiously declare HUFELAND'S reservations—which fully deserve to be considered, when the outerclothing is of mixed material—to be unfounded when the outerclothing is wholly of wool.

XXI.—THE COAT.

I WISH to lay great stress upon a particular feature which should characterize the Sanitary Woollen Clothing, as my own personal experience in the matter has been truly astonishing. It was first suggested to me by the excellent results which I have found in medical practice from the application of the "Reglin" poultice to the front middle line of the body, from the pit of the neck to below the navel. The remarkable relief thus afforded to the blood-pressure is due to the terminal convergence in this region of all the blood-vessels in the trunk of the body, and to the considerable enlargement of their areas, consequent upon the stimulating action of the poultice. This is tantamount to expansion of the minute blood-vessels of the entire surface of the trunk; and as upon their size depends the measure of evaporation, it follows that their expansion will cause the skin to give off watery vapour with greater freedom and rapidity.

This shows that particular attention should be paid to

the middle line of chest and stomach—that is to say, the clothes should keep this part *warmer* than the other surfaces of the body, which is easily effected by means of a double-breasted coat, similar to that worn in the Württemberg regiments. The two sides of the coat are made to overlap, whereby the middle line is covered twice as thickly as any other part of the body. This plan for maintaining extra warmth operates similarly to the Reglin poultice. The double covering secures a more abundant blood-supply for the entire skin, and the vapoury cutaneous exhalation thereby produced can easily escape where the coat is only of one thickness.

As the principle of extra warmth over the *front* middle line of the trunk has been contested, and it has been argued that extra warmth is more necessary at the *back*. I will here repeat the practical grounds for my favouring the *front* line theory. First comes the law of the cutaneous circulation, which has been clearly established by experiments; and as to whose correctness everyone can convince himself by a simple experiment on his own body. If a mustard plaster, two or three fingers broad, be placed at about the middle of the uncovered arm, the reddening of the skin will not be confined to the spot which is covered, but will progress as far as the shoulder, and simultaneously there will be a feeling of warmth in the reddened part of the arm. In the other half of the arm, the converse will take place, namely paling of the skin and feeling of chill. If the plaster be shifted down to the wrist, the skin from that point to the shoulder will become red and warm, and only the hand be pale and cold. If, finally, the plaster be applied to the finger ends, the entire arm from the finger ends will become warm. To the same principle is due the common use of gloves. Everybody knows that if his finger ends be chilly, the whole arm is cold, however well it may be clothed. If,

however, he succeed in warming his fingers, by means of gloves, or by putting his hand in his pocket, or by rubbing the hands, the chilly feeling vanishes from the entire arm, without the latter being rubbed or its covering increased. Hence may be deduced the rule: In order to suffuse the skin with blood, and thereby to warm a whole region of the body, it is not necessary to increase the covering of this whole region, or to submit it to the action of a factor which is calculated to expand the blood vessels. It suffices to bring such agencies to bear on the place where the large vessels, which supply the whole region with blood, terminate, because the stimulant to expansion in the chief vessel is transmitted only in a retrograde direction towards the heart, benefiting all the branch vessels in its course, while there is no transmission in the opposite direction. Secondly, it is not only unnecessary, but it is objectionable, to clothe the entire region equally, because this impedes the passage of the exhalation from the skin. This law of the suffusion of the skin with blood is expressed in the ancient popular rule of health, to keep the hands and feet warm, and in the well-known danger of allowing the feet to become cold; and no one will dispute its truth in respect of the members of the body.

If, however, it be contended that this law is applicable to the limbs but not to the trunk, I reply that the front middle line of the latter, and especially the navel, are precisely what the ends of the fingers and toes are to the members, namely, the termini of the chief blood vessels. In this front middle line terminate all the intercostal and transverse vessels of the *parietes* of the abdomen, and, in addition, at the navel, the two epigastric and two internal mammary arteries. That the above-mentioned law holds good for the abdominal region is recognised by the common use of bandages to excite warmth, as well as by

the application of hot cloths and of friction to the navel, as the best means in cases of colic to withdraw the blood from the intestines, and to obtain relief by an outbreak of perspiration. It would not occur to anybody to apply these measures to the back of the trunk.

There remains the region of the chest, and I recommend doubters to try (as I have done in numerous cases) the effect on fever patients of applying the REGLIN poultice (see page 73) to the middle line of the chest; the effect on the skin of the whole trunk will be found to be the same as that exercised on the skin of the whole arm when a mustard plaster is applied to the hand. As proof that my recommendation on this point is confirmed by extensive practical experience, I may quote the fact that the official statistics of the Württemberg army corps, which is clothed in the double-breasted coat, show an annual loss through death and disablement of 164 men per 10,000, while the remaining German army corps, which are clothed in the single-breasted coat, show a loss of 322 men per 10,000. To this I would add that when the Württemberg army corps was attached to the North German army, it was suggested that the former should adopt the single-breasted coat. In order to decide as to the desirability of such a change, comparative experiments were instituted, which resulted so much in favour of the double-breasted coat, that not only was this retained by the Württembergers, but the Prussian uniform was made more nearly akin to the double-breasted coat, by extending the flap on one side, a method which, however, only partially attains its object. Lastly, the use of a "chest-warmer" is generally recognised by doctors, and is in many districts a regular article of clothing.

The ground which I take on this question has been assailed with arguments derived from the habits of the

animal world, a field in which, as a zoologist, I am very pleased to meet objections. Nature invariably provides those parts of animals with the thickest covering which are most exposed to external influences. This region is certainly the back, in the case of quadrupeds, but in the case of bipeds—the birds—it is the breast and abdomen. As human beings are not quadrupeds, the most suitable example in this case is the bird. And how does the quadruped act when it feels cold? It does not lie on its back, but rolls itself together and covers breast and belly with its limbs, in order to maintain its front warm. Man himself instinctively does the same thing, cowering together in the cold, and covering his front as much as possible with the arms and legs. When people feel cold in bed they do the same thing, or lie on the stomach, when they feel the cold much less than if lying on the back. Again, it has been pointed out that people usually stand with their backs towards the fire or the sun, but this is due to the objection commonly felt to the fire or the sun blazing in the face. When Wool-wearers feel cold at the back, it is because they have not followed my directions in the matter of the coat. The human body, especially with corpulent people, is naturally somewhat convex in front, and concave at the back, so that the clothing in front is more or less pressed against the body, preventing any ascending current of air, which on the other hand, is facilitated by the conformation of the back. If, therefore, the clothing is not made so as to fit closely to the shape of the back, or, when the fit is deficient, my recommendation is neglected to wear a belt round the coat, whereby the latter is fastened closely round the waist, a channel is formed for an ascending current of air between the body and the clothing, causing the chilly feeling at the back.

In conclusion may be enumerated the features which should characterise the Sanitary Woollen Coat :—

1. Absolute freedom from linen or cotton.

2. Double thickness of material along the middle line of the trunk.

3. The material should be either undyed, or dyed with a sanitary dye, such as indigo.

4. The coat should be as far as possible without lining, at least in the portion covering the breast, as otherwise there will be too many layers of material one above the other, impeding the exhalation.

5. The coat should fit closely to the shape, and the sleeves should either be tight, or at least closed by webbings, to prevent the injurious effects of a current of air ascending between the coat sleeve and the shirt.

6. Stockinet cloth is more suitable for a coat than a rectangular web, as it facilitates the necessary close fit, and offers least impediment to the free movement of the body.

7. A stand-up coat collar is better than the lay-down form, and it would be well to dispense with the coat-collar altogether, as it is a useless encumbrance.

8. The coat should at all times *be kept buttoned up all the way*, as prescribed in the army. Those to whom this may seem irksome will find it so only at the very first. Every soldier will bear witness to the comfort of the buttoned-up coat.

9. The pockets should be so arranged, and so used, as to cause the minimum of impediment to the passage of the exhalation from the skin. They must of course be made of woollen material, or of washleather. Pockets in the breast of the coat should, if possible, be avoided, and are least objectionable in the tails of the coat. A pocket depending from a belt, and made of the same material, would be best, as worn in the Middle Ages by men, and at the present day by ladies.

XXII.—THE WAISTCOAT AND OVERCOAT.

I CONSIDER that a waistcoat underneath the coat is not only superfluous, but hygienically to be rejected. A common argument in favour of the waistcoat is, that it enables the wearer to throw open his coat at times, and that this is decidedly an advantage. I admit the advantage when the coat is unsanitarily made, and the unsanitary lining becomes saturated with perspiration and mal-odorous. When, however it is made according to my recommendations, without lining, and of porous stockinet cloth, and further when it is free from unsanitary dye, I have never felt any necessity for opening it, even in the greatest heat, and when I was most freely perspiring. All that I at times need in this direction is, on strenuous walking excursions, to *remove the coat altogether*, and enable the perspiration in shirt and coat to evaporate with perfect freedom. This is hygienically a much more correct proceeding, and, even in a draught, is less dangerous than simply throwing open the coat.

Further, it is clear that when no waistcoat is worn the instances in which a desire for relief is felt will be much rarer, because this desire is only due to the insufficient escape of the exhalation, which is caused by wearing too many layers of material on the body, or too thick a cloth. Whoever wears a waistcoat underneath his coat provides a continuous obstacle to the passage of the exhalation from the skin, and is thereby frequently incommoded; while he only secures the small advantage of being at times able to throw open his coat without looking peculiar. This is no advantage from the hygienic point of view, but only from that of appearance, and is even then inconsiderable, when it is reflected that the desire to throw open the coat is not

usually felt in society, or at least only when in society in the open air, at lawn tennis parties and the like, when the removal of the entire coat is permitted. It is customary to play billiards "in shirt sleeves," and the waistcoat is worn to conceal the braces. It is obvious that in such a game as billiards the braces would be better replaced by a belt, and in any case there is no practical objection to a man playing billiards without a waistcoat, which is an ugly garment, especially when viewed from behind. In all these matters, we are too much the victims of habit and fashion. If we would only think for ourselves, and apply the logical conclusions, we should be freed from a slavery to whose irksomeness we are partly insensible, because we have grown up in it.

If, however, elderly people feel the necessity for the additional warmth which a waistcoat procures, I recommend that it be made of loosely knitted wool, so as to facilitate as much as possible the passage of the exhalation from the skin.

It is instructive to consider the manner in which the garment named waistcoat originated. In the Middle Ages, when in my opinion men's dress was at once most hygienic and most pleasing to the eye, a man wore, apart from the shoes and hat, only three garments, viz.: close-fitting coat and leg-covering, with a sleeveless mantle in case of severe weather. To these was subsequently added the shirt as underclothing. The first change took place when the mantle was reduced to the proportions of a cape, still without sleeves. Next, sleeves were added, and so the garment was converted into the coat which is now worn over the waistcoat. The close fitting coat was degraded to what is now called a waistcoat, and hence for a long time continued to be of the original length, *i.e.*, it retained the skirt, or flap, which afterwards disappeared

from it, as did also the sleeves of the original coat. My endeavour is to procure a return to the old costume. For a man's clothing, shirt, breeches, and close fitting coat are sufficient, and only when it is necessary to protect these garments from rain, or when extra defence against wind and weather is required, is a mantle needed, such as was worn in the Middle Ages. I have had such a "weather-mantle" made, resembling in form the South American poncho. It is simply a long piece of material, about a yard wide, with an opening in the middle for the head. On the inner side of the hinder portion a girdle is fixed which may be fastened round the waist either under or over the front portion. In the former case the front portion hangs free, and one extremity of it can be thrown over the shoulder, forming the artistic fold of the Roman toga. If, however, the front portion is secured by fastening the girdle round it, one extremity of the hinder portion may be tucked in under the girdle, so as to give an artistic fold, either on the right or on the left.

In addition to these modifications, the weather-mantle can be made to assume various forms, all more or less artistic and practical; and it has been widely recognised as a happy solution of the overcoat question. To go the whole winter and half of the spring and autumn in an overcoat weighing ten to fifteen pounds, with the arm threefold encased, so that it can hardly be bent, much less freely used, is the height of absurdity. People who have become really healthy under the Sanitary Woollen System require the heavy and expensive overcoat as little as the waistcoat, and even my Russian friends assure me that, whereas in severe frost they formerly buried themselves over the ears in a fur cloak, they now find that an autumn overcoat is ample protection.

I will sum up the matter thus: The most chilling clothing

material is linen; cotton is somewhat less chilling; wool is the warmest. Those who wear shirts of linen, and linen material in waistcoat and coat, require a fur mantle in winter to counteract the chilling effect of the linen. If cotton be substituted for linen, a woollen overcoat will suffice. But those who discard from their clothing all chilling material, *i.e.*, linen and cotton, require neither waistcoat nor overcoat.

XXIII.—THE HEAD-COVERING.

IT is a well-known fact, which has never been satisfactorily cleared up, that baldness is much more common among men than among women. Let me try to explain this phenomenon. Some people fancy that the competition of the beard is precarious to the hair of the head, and to a certain extent abstracts from the latter its due nourishment. This somewhat crude suggestion is refuted by the long beards and luxuriant heads of hair which characterised our ancestors. Another notion, that the more strenuous head-work which falls to the share of the male sex is responsible for the loss of the hair, may not be absolutely negatived, as undoubtedly among those who live by manual labour, there is relatively less baldness than among brain-workers. But this cannot be the sole nor even the chief reason, otherwise the proportion of baldness among governesses, school-mistresses, &c., would be greater than among manual labourers, which is by no means the case. Yet another conjecture is, that the unnatural custom of cutting men's hair, first adopted when nature was abandoned in favour of the fashions of civilization, is to blame for this evil. Undoubtedly, cutting the hair has an influence on it, but whether this influence is wholly unfavourable will seem

very doubtful to anyone who reflects how frequently the hair is prevented by being cut from falling out, and how, on the other hand, the practice of wearing the hair long has been suspected, not altogether unjustly, of being at least partly the cause of baldness. Another theory accounts for baldness as the result of dissolute habits, especially of excessive indulgence in alcoholic stimulants, and undoubtedly in this respect the male sex compares disadvantageously with the female sex. It cannot indeed be denied that the pleasures of drinking are apt to decimate the hairs of the head, as also that care and worry have the same tendency. But to generalise from this would be a grave injustice to many most respectable possessors of bald heads. Further, it is of course clear that certain diseases will account for baldness in individual cases, but not for the above-named fact that baldness is relatively more common among men than among women. Lastly, that baldness may be inherited is as certain as that this in no way accounts for the disproportionately large number of bald men as compared with women; for the sisters of the hereditary victims to baldness can usually show an excellent growth of hair, notwithstanding that they must have equally inherited the tendency to baldness.

The most natural cause, which suggests itself most readily—not indeed the sole cause but the chief one—of the phenomenon in question is simply the difference between the male and female head-covering, and here three points have to be considered:

1. The female head-covering is, as a rule, far lighter, more airy, and more porous than the usually almost waterproof and exceedingly absurd male head-coverings, such as the stiff felt hats and high hats, with the strip of leather which encircles the forehead and effectually retains the perspiration.

2. Women rest the hat or bonnet on the head in such a manner that the air can freely circulate between, while men irrationally force their heads into their hats, which press on the skin of the brow, so that no circulation of air, or escape of the skin's exhalation is possible ; this and the compression round the skin of the head must injure the growth of the hair.

3. The conditions under which women live are usually more favourable, inasmuch as they have less occasion than men to make use of unsanitary head covering, their occupation keeping them to a greater extent indoors. Usage and custom permit women, especially in some countries, to dispense to a certain extent with a covering to the head when out of doors, and the much greater abundance of hair on a woman's head enables her to enjoy the luxury of being with an uncovered head in the open air, which is denied to the unsanitarily clothed man, easily susceptible to cold.

The question now arises whether a head-covering cannot be devised which shall do no injury to the growth of the hair, or to the head.

The best head-covering would certainly be—none at all. But usage, and in many cases weather conditions, render this impracticable, and as both usage and the weather conditions must be reckoned with, the problem to be solved is the construction of a head covering which will approach as closely as possible the ideal of the natural head-covering ; and this has been done.

Three points require to be considered with the hat : 1. It must consist exclusively of animal fibre ; all cotton or linen lining must be excluded, as well as the usual strip of leather which encircles the forehead. The latter may be replaced by a strip of felt, or, better still, the hat may remain completely unfurnished, like the Turkish fez.

2. Not only are the hard hats, now in such general use, bad because the pores of the material are closed, impeding the passage of the exhalation from the head; but the shellac used in stiffening them has an injurious effect, from which the cherry gum used for stiffening the material of the soft hats is comparatively free. Of course, soft hats cannot be worn in all cases, and on ceremonial occasions the hard hat may be chosen; but ordinarily the hygienically superior soft hat should be worn. 3. The question of colour or dye must not be lost sight of. The natural coloured (*i.e.* undyed) hat is greatly to be preferred to one that is dyed, especially when the dye is that usually employed for black hats, viz., logwood. At my instigation, after many unsuccessful trials, a really black hat has been manufactured which is pure indigo-dyed, without admixture of logwood, and this is hygienically the best of its kind.

Camel hair is admirably suited for felt hats, and hats of this material are highly to be recommended.*

The Sanitary Woollen Hats are manufactured in the most various forms, to suit every taste and shape of head.

It is obvious that the use of Sanitary Woollen hats cannot be too strongly recommended to those who are already bald, or are threatened with baldness, or who suffer from perspiration or pains in the head. Persons who are becoming "thin on the top" may by this means, if taken in time, still save their hair, and avoid the alternatives of baldness or of wearing a wig, either of which is objectionable, both on hygienic and æsthetic grounds.

To those whose baldness is past praying for, in addition

* On the same principles as regards animal fibre and sanitary dyes, Sanitary Woollen hats and caps are manufactured of cloth, which can be equally recommended with the felt hats. As a substitute for the straw hat, in summer, I have caused hats for men and women to be prepared of braided horse-hair.

to the Sanitary Woollen hat may be recommended the comfort to be procured in cold weather by wearing a pure woollen indoor cap. The slow heat-conducting property of animal fibre, whether in the form of the natural hair or of a pure woollen cap, checks the too rapid escape of warmth from the head, and excludes the access of chilling draught to the skull. At night a cap of the Sanitary Woollen stockinet or knitted material may be worn with advantage by those who are deficient in the natural protection to the head afforded by abundant hair.

XXIV.—THE SANITARY WOOLLEN COLLAR AND CUFFS.

A SMALL, but by no means unimportant, item in men's clothing is the shirt collar, which, however, is really more an ornament than a protection to the throat. The throat is best left uncovered, and a shirt collar is therefore a superfluity.

But as a matter of fact the shirt-collar cannot be dispensed with, and if the throat is to be to some extent clothed, it should be sanitarily clothed. For not only its close connection with the respiratory passages, but also the delicate nature of the throat itself, render this imperative, and the unsanitary shirt-collar is a common source of difficulty in swallowing, swollen tonsils, laryngeal catarrh, constant hoarseness, and even of lung affections.

The shirt-collar should therefore be of pure animal wool.

In this matter my experience has been somewhat singular. I had never paid much attention to the subject, although I have had considerable trouble with the throat

at one time or another in my life, but when I discovered the Sanitary Woollen System I assumed that the throat required no special care, and I therefore discontinued wearing a neckerchief. Nor did I make any difference on account of sundry ailments of the throat from which I had occasionally suffered considerable inconvenience; because such affections recurred at much greater intervals, and were milder in character than formerly, except a particularly obstinate cold caught one spring. Over this I pondered a good deal, for it permanently injured my voice and thereby greatly interfered with my chief pleasure—sitting down at home to the piano and singing a song. Since the spring the voice had retained a persistent hoarseness, the higher notes became impossible at times, and it frequently broke down altogether.

My attention was first directed to the subject of the clothing of the neck when I discovered that, in contradistinction to the Sanitary Woollen shirt, my linen collar very soon became mal-odorous. From that moment I regarded the linen collar as an unclean thing, and considered how it could be replaced by a woollen substitute.

Frequent inquiries which I received encouraged me in the prosecution of my purpose, but I regarded the whole thing as rather insignificant, and when I first put on my woollen neck-covering, consisting of a cloth cravat and a white cashmere collar, I felt disposed to laugh at myself for riding a hobby, and was pleased to find that the contrivance did not look unsightly. Of course I at once felt the comfort of the wool, but I did not foresee anything more.

On the very next day, however, I felt that the condition of my throat had much improved, and from time to time I expectorated loose phlegm without cough or effort of any kind. When, some days after, I first attempted to sing

again, my daughter remarked that my voice sounded plainer and clearer than ever. I had noticed it myself, without attaching any particular importance to the change, because it formerly occasionally varied from better to worse. A few days later I again tried, and my voice was, at the first song, as clear as it had ever been after a quarter of an hour's preliminary practice.

The cleansing or clearing of the throat by the secretion of mucus continued, and there was no further disturbance, the voice remaining uniformly good, whereas in former days, even prior to that excessively bad cold, it was constantly uneven.

Perspiration is freely exuded at the point where the collar touches the neck, and the linen collar, which readily takes up moisture, whether of perspiration or of the atmosphere, becomes in consequence damp and chilly, and a common source of throat disorders. It is therefore of the highest importance to clothe the neck with material, such as animal wool, which will not set up a chill; and this is recognised by the frequent use of woollen wrappers and comforters. The latter, however, may be dispensed with by adopting the Sanitary Woollen Collar and Cravat; and I strongly recommend everyone, in the interest of his throat, to make the change.

The Sanitary Woollen Collar is made of white Cashmere or of natural colour wool, and the former in washing undoubtedly loses it whiteness, and, unless sulphured, acquires a yellowish tinge. This is in itself no disadvantage, as the soft yellowish collar is æsthetically superior to the stiff white collar, as every artist will admit; but practically it is an obstacle to the more general adoption of the Sanitary Woollen Collar by the large majority who have not yet emancipated themselves from the slavery of fashion and habit. A more serious consideration is the inevitable tendency of the Woollen Collar to shrink.

This may be to a great extent counteracted by careful washing, and especially by buttoning the collar round a wooden block, cut to the requisite size, during the process of drying.

In any case, the owner of a Sanitary Woollen Collar which has shrunk by repeated washing to impracticable dimensions has the consolation that he has derived from it an important hygienic advantage, and although the collar may be of no more use to him, it may serve for younger members of the family.

Cuffs are not requisite from a hygienic point of view, but if they are worn it is desirable that they should be of wool, as the chilling effect of cuffs of vegetable material undoubtedly disturbs the proper distribution of blood in the arm.

XXV.—THE SANITARY WOOLLEN HANDKERCHIEF, AND CATARRHAL INFECTION.

IT is an old rule that catarrh will be sooner cured if the handkerchief be changed as often as practicable. This must be due to the presence in the used handkerchief of an infectious agent which renews the catarrhal complaint; and herein lies a striking confirmation of my theory respecting the effects of the "noxious" emanations. This infectious agent is the well-known characteristic odorous matter of handkerchiefs used by catarrhal patients, and is absorbed by vegetable, but not by woollen fibre.

These considerations led me to adopt material of pure woollen cashmere for handkerchiefs, and the woollen handkerchief in the first trials which were made with it showed at once such remarkable sanitary advantages that its use has continually spread. Not only the adherents of

my Sanitary Woollen System, but also outsiders, have taken to it. The use of the woollen handkerchief causes the nasal secretion to decrease in a remarkable manner, and it notably diminishes the tendency to catarrh of the nasal and other respiratory passages. The most obstinate colds have repeatedly disappeared, almost with suddenness, when the linen handkerchief has been exchanged for the woollen, as the catarrhal poison which lurks in the former, and continually re-infects, is not retained by the latter.

The idea of using woollen material for this purpose is to many people repellent, from its strangeness, and from an erroneous notion that the woollen handkerchiefs must be rough and disagreeable. They are, on the contrary, beautifully soft and smooth, and whoever has once become accustomed to the warm, comfortable, *wholesome-smelling* woollen handkerchief will never revert to its antithesis of linen.

The woollen handkerchief possesses the further advantage that it is much more agreeable for drying up the perspiration, as it remains longer dry than the handkerchief of vegetable fibre, which at once becomes soaked through like a sponge. Perfumes imparted to a woollen handkerchief cling to it much longer, and retain their fragrance, while perfumes on handkerchiefs of vegetable fibre soon acquire an evil odour, and are dissipated more quickly.

The woollen handkerchief has certainly one disadvantage, in not being suited to the polishing of eye-glasses, but wearers of eye-glasses can easily carry a piece of wash-leather for the purpose.

XXVI.—THE SANITARY WOOLLEN GLOVES.

THE importance of maintaining the extremities at their natural degree of heat, and of thereby enhancing the

circulation of the blood in the vessels of which these extremities are the termini, has already been explained (see page 146). The insertion of the hands into a pair of warm gloves before going out in cold weather (in very cold weather the gloves may with advantage be first warmed at the fire) has an immense effect in maintaining the body's normal temperature, and gloves and hat are all the extra out-door clothing which the Wool-wearer needs. It will thus be seen that the manner in which the hand should be covered deserves careful consideration. As with the clothing of other parts of the body, fashion has hitherto been the chief guide in dictating how the hand shall be covered, and the material most generally used is perhaps that which is least suitable from a hygienic point of view. The ordinary kid glove has two radical faults ; in winter it does not keep the hand warm, in summer it is practically impervious to the exhalation from the skin. When the need of extra warmth is felt, this impervious material is lined with fur, inducing perspiration which cannot escape, and rendering the glove mal-odorous and unwholesome. The same thing happens when kid gloves are worn in hot weather ; and of course when, as is not unfrequently the case, the hands are chronically damp and clammy, the evil is intensified. Here again the remedy is to be found in a revolt from the dictation of fashion in favour of the guidance of common sense. The hand requires to be covered with material which is :

1. Non-conductive of heat. *Pure* animal wool retains the heat of the hand in winter, and excludes the heat of the sun in the summer.

2. Pervious to the exhalation of the skin. *Pure* animal wool of porous web maintains the hand dry, and allows the free escape of the superfluous heat exhaled.

3. Non-absorbent of evil odour. Porous, *pure*,

sanitarily-dyed Woollen Gloves retain none of the noxious matters exhaled, and remain wholesome and "sweet" to the last. Persons whose hands perspire to an abnormal extent, should frequently change their Sanitary Woollen Gloves, exposing them to the sun and open air, and even washing them in luke-warm water from time to time, until the condition of the hand has improved.

A much superior glove in point of perviousness to the ordinary kid glove, is made of undyed chamois leather, and although inferior to porous woollen gloves free from unsanitary dye, these chamois leather gloves may be worn even in hot weather, and can easily be cleaned in lukewarm water.

XXVII.—WOMEN'S CLOTHING.

I HAVE several times been reproached for attending too exclusively to Men's clothing, and neglecting that of Women. This has been partly due to the much more conservative and reserved attitude at first assumed by women towards my endeavours at reform—from this point of view I should be very glad if the reproach were uttered more frequently—and partly because women's clothing is in many respects hygienically superior to men's, although it by no means follows that it is hygienically perfect.

Women who desire to be sanitarily clothed will find that under my Sanitary Woollen System they can provide themselves with every article of attire from top to toe, and it is in this order of sequence that I now propose to consider Women's Clothing.

As regards the hat (see also Chapter 23), the materials employed should consist only of woollen cloth, or felt, or

horsehair. With these materials, and with feathers, and ornaments derived from the animal or mineral kingdoms, hats may be made which are both hygienically and æsthetically irreproachable, while avoiding unsanitary materials, and injurious, poisonous dyes.

No fault can be found with the form of the collars usually worn by women, but these should be of wool, for instance of cashmere, or of woollen lace.

The sanitarily clothed woman need not be afraid of wearing low-necked dresses on occasion, as the neck is not very sensitive, and is much more hardened to resist the effects of exposure than in the case of those who are unsanitarily clothed. It should, however, be a strict rule that the neck of the dress should be equally low behind as in front, so that the proper distribution of the blood suffer no interruption, as it must do if the dress be only cut low in front.

Respecting the upper half of women's dress, as far as the waist, the principles generally adopted of closely-fitting garments, made of light materials, in as few layers as possible, are correct; the materials and linings should, of course, be pure woollen, and free from noxious dyes. Further there should be double thickness of covering down the front middle line of the trunk, not only as regards the underclothing, but also the dress. The great demand which has lately sprung up for stockinet bodices is an instinctive step in the right direction, as pure woollen stockinet cloth, undyed, or sanitarily dyed, is quite the most sanitary dress material.

I entirely approve of the close-fitting sleeves usual in women's dress. When the sleeves of the dress are short, the necessary warmth should be maintained by long gloves of woollen or undyed leather material, which also men would do well to wear drawn over the coat-sleeves.

As regards the outer clothing of women, from the waist downwards, the following considerations, in addition to those of pure woollen material, free from noxious dye, should be observed: 1. The dress should not be too long; all so-called national costumes have rightly, in every country and at every period, been short in length. 2. That the folds at the waist should not exceed moderate bounds, as otherwise dresses of woollen material become too heavy, and hamper the movement of the limbs, besides constituting an impediment to the passage of the exhalation from the skin. 3. The decoration should consist less in layers of material, in folds, or in drapings, and more in embroidery, lacing, trimming, and introduction of vari-coloured stripes of woollen material.

The Girding of the Loins by corset and belt, as generally practised by women, is quite hygienically correct, provided that it be done on the principles laid down in Chapter 28.

A serious fault in women's clothing is the too great number of layers of material over the lower portion of the trunk. At this point the lower part of the bodice, the upper part of the skirt, the corset, the petticoat, the chemise, and the drawers, all overlap one another, forming at least a six-fold layer over the body, which in this region is kept much too warm, with inevitable prejudice to the proper distribution of blood and to the very necessary facility for passage of the exhalation from the skin. To remedy this, bodice and skirt should not overlap, and the best plan is to sew the latter to the lower edge of a stockinet bodice. Further, the petticoat, either by using tapes or suspenders, or by providing oval interstices in the material, should be made, so far as it extends over the corset, as light as possible. Lastly, if the combination garment (see page 143), be substituted for the chemise and drawers, the number of layers may be diminished by one half.

As regards the stocking, what has already been said in Chapter 16 is here applicable. Women should especially note that the garter is objectionable, as causing a congestion of the blood, which, even without this accessory, requires to be guarded against under certain conditions. It is better to wear long stockings, and to keep them in position by suspenders.

In the matter of the Shoe, women have long been better off than men, as they usually wear shoes of much lighter and more porous materials. Due attention should be paid to considerations of woollen material and sanitary dye (see Chapter 17).

XXVIII.—THE SANITARY WOOLLEN CORSET.

IN connection with the reference in the last chapter to girding the loins, I will make a few remarks on the subject of ladies' corsets. If the views of the leading authorities on health-culture are correct, there is nothing more prejudicial to the health than the corset. Indeed, their attack on the corset comprises pretty well all that they have to say respecting ladies' clothing, and it is usually enforced by dreadful representations and models of the distortion of the liver which is caused by tight lacing. This may be true, but it is not the whole truth.

The fault does not consist in the wearing of a corset, but in the material of which it is made. This is usually substantial (possibly even pasted) linen cloth, and (1) concentrates, in an intensified degree, the disadvantages of clothing made from vegetable fibre; (2) is, as a rule, laced too tightly, because the great enervation of the body which ensues induces a feeling of want of support and a

tendency to unshapely increase of bulk, only to be restrained by the use of force, under which the internal organs suffer.

Ladies, however, who have adopted, and especially those who have grown up under, the Sanitary Woollen System, and who wear the Sanitary Woollen Corset, need to use no force in order to preserve the shape; their compact, firm figures will not require support. They do not, therefore, lace too tightly, and in the Sanitary Woollen Corset they have all the advantages of girded loins without the disadvantages.

It is with the corset as with the boot. Hygienic science has hitherto treated the evil as one of mechanical conditions and of space, while it is really due to the use of unsanitary material.

XXIX.—THE TREATMENT OF INFANTS.

THE frequent complaints of the great mortality among infants would nearly if not quite cease, if children were from their birth clothed and bedded in wool. The fearfully high statistics of deaths of children are doubtless in part due to other factors, such as the neglect or inability of their mothers to suckle them; but it has been proved that children brought up in the wool, even when their nourishment has been artificial—good cow's milk with lime-blossom tea—thrive splendidly. The great mortality among children may be considered to largely proceed from the fact that a great number of them succumb to the faulty conditions which ensue from the employment of vegetable fibre in clothing and bedding, and only those survive which are not so strongly affected by the deleterious qualities of vegetable fibre.

It is a common mistake to bathe infants daily, or even both night and morning, and excess in this respect may not unfrequently account for the delicacy and ill-health of well-to-do people's children, who receive only too much attention, contrasted with the thriving, if grimy, condition of children whose ablutions are comparatively neglected.

This must not be understood as a defence of dirty habits, but rather as a plea for more respect for the nature of the human body, which, whether infant or adult, is constantly treated by rule of thumb, under the guidance of fashion or tradition, and with insufficient regard to the constitution, especially to the skin and its functions.

Enough has been already said in these pages to show that the frequent immersion in water of the tender, unprotected body of an infant; the application of soap which may or may not contain injurious ingredients, and which removes from the skin the natural oil which serves to protect it; and the subsequent putting the dry clothes over the dried skin may seriously affect the distribution of the blood, and thereby endanger the child's well-being. This is especially the case with infants brought up in the Sanitary Woollen System, who remain clean and free from offensive odour much longer than children in unsanitary clothing and whose skin, on the other hand, being already in full activity, requires no additional stimulant. Removal of dirt where such is apparent is quite sufficient, without constantly bathing the entire body, which latter operation should not be undertaken at shorter intervals than at least a week. It will, moreover, greatly conduce to the health of the child if it be well anointed over the whole body with bath oil after each immersion, as explained in chapter 42, on Bathing.

The practicability of an infant's outfit consisting wholly of animal woollen materials meets with especial scepticism

in the matter of the woollen "diapers." It is assumed that these will chafe the child, that from constant wetting and washing they will become hard and stiff, that—in short, it is ridiculous and not to be thought of. As a matter of fact, woollen diapers are found in practice to answer exceedingly well, not only from a hygienical point of view, but because they keep much cleaner and therefore involve much less trouble in washing. They cause no chafing, assuming that proper attention is paid to the child and that the parts are anointed, while the advantages in respect of comfort and absence of chilly feeling when first put on, and even when they become wet, as well of freedom from offensive odour, cannot be overrated. When the diapers are only wetted and not dirtied, they need merely be hung up to dry, when no trace of odour will be perceivable. These praises may also be freely accorded to the remainder of the Sanitary Woollen infantile outfit. The dresses are, of course, long-sleeved and high-necked, the prevalent absurd fashion of exposing children's necks, arms, and legs because "they look so pretty" being, it is perhaps unnecessary to say, an indefensible indulgence of parental vanity at the expense of the health of the children.

An argument which requires more serious consideration is the objection not unfrequently made that the Sanitary Woollen System is enervating and "coddling," especially for children. This is not only wholly unfounded, but is precisely the converse of the truth. The facilities and assistance afforded to the skin to perform its functions in a normal manner prevent the accumulation in the tissues of matters which should be excreted through the pores. The flesh is consequently firm and hard, and the surface blood-vessels are in full activity, with the result that they are able to effectively assist the body to repel attacks from chill or other influences likely to set up disease. Children and

adults are thus "hardened" by the Sanitary Woollen System in the fullest sense of the word.

All the woollen materials employed should be wholly free from dye.

It remains to be added that the benefit accruing to infants from the Sanitary Woollen System may be diminished or enhanced by their surroundings. Pure, fresh air is a first necessity to children, and may be freely admitted if the clothing and bedding are of wool. It too often, however, happens that the clothing and bedding of the mother or nurse are of the old unsanitary order. This is nearly sure to be accompanied by more or less dread of chill from fresh air, and, as a result, the child may be compelled to live, and especially to sleep, in an impure atmosphere filled with the emanations which proceed from clothing or bedding of vegetable fibre. It is thus of great importance that not only the children themselves, but that also those who have daily and nightly charge of them, should be Sanitary Wool-wearers, and should welcome and care for the perfect ventilation of living and sleeping rooms.

Infants clothed and bedded in wool are especially free from molestation by flies, which are attracted by malodorous emanations. In connection, however, with the question of ventilation, it is worthy of remark that when the atmosphere is still, and the child is quietly asleep, the air exhaled from its lungs tends to accumulate over its face, and the unconscious aversion to such an atmosphere is certainly one reason why sleeping children are restless, and change their position from time to time. As very young infants cannot do this, the accumulated vitiated air should occasionally be fanned away (from the head towards the feet), when the child will sleep more calmly.

In conclusion, I will cite the following practical testi-

mony which I have received to the advantages of my System for Infants :—

"The writer, feeling convinced of the value of the Sanitary Woollen System, procured, in anticipation of the approaching birth of a child, an entire woollen outfit for the newly-born baby, which from its first existence has never worn a particle of linen. The appearance of the child, now six months old, is all that could be wished ; its limbs are agile and strong, the body is round, the flesh firm, and, in short, the child is as healthy as it can possibly be.

"As to the practical worth of the Sanitary Woollen System, the writer has noted down the opinions of the monthly nurse, a woman of twenty years' experience, as of more value than a great deal of theorising one way or the other. At first the whole thing appeared to her ridiculous, and she used the various woollen articles with reluctance ; but after some time she expressed herself as follows :—

"'Although I am poor, and have brought up six children in linen, I would not hesitate to clothe the next in wool, for it gives only half the trouble of linen. The colds which babies so frequently catch are completely prevented by the equable and sustained warmth of the woollen clothing, which is of the greatest importance, as so little heat is generated in the body itself. This particularly applies to the wet cloths which, when of linen, grow cold on the body, while the woollen ones remain warm. Another advantage is the time and labour saved in ironing. The washing of the clothes is simpler and quicker, and that of the frocks and shifts is not required so often, as I am surprised how long they keep clean and free from smell. I also notice that daily bathing and soaping do a child more harm than good. This child was best when simply washed, without soap, each day, and afterwards lightly rubbed with a woollen

rag soaked in oil; it was only bathed once a week. I intend to recommend the bringing up of children in wool wherever I can.'

"To this may be added, that when the child was out of doors for some time, the clothes which it wetted frequently dried on the way, a proof of the rapid evaporation; moreover, they *were free from odour.*

"In conclusion, the cost was about the same as of a linen outfit, having regard to the fact that only half the usual number of articles was necessary."

XXX.—SUMMER AND WINTER CLOTHING.

ACCORDING to my own experience, and to the communications received from others, I can answer that the Sanitary Woollen Clothing has acquitted itself splendidly in summer weather. Not but that we too have perspired, nor that we have perspired much less—assuredly not more—than others, but because the perspiring is effected much more easily and opportunely; that is to say, before the perilous thickening of the blood sets in, which in extreme cases causes apoplectic fits. Here I may mention that it is a mistake to suppose that it is part of the Sanitary Woollen System to keep on the coat uninterruptedly, even in the greatest heat. On the contrary, a follower of the System may do that which people with the ordinary style of clothing hardly dare to venture.

After freely perspiring, the coat may be removed without fear of the consequences, and with considerable refreshment. This is a privilege which others cannot enjoy for fear of taking cold.

I advise wearers of the Sanitary Woollen Clothing not to

seek relief in unbuttoning or opening their coats when the heat is intense. The relief is only felt at first, and soon changes into a feeling of an opposite character, for the partial cooling along the middle line of the chest, quickly interferes with the body's power of evaporation. The only correct plan is either to take the coat off, or to retain it closely buttoned up. In walking, when the heat is great, it is distinctly better to keep the coat closely buttoned up. At first the perspiration will pour out freely, although it will soon cease, unless, indeed, the weather be excessively sultry. But when the destination is reached the coat may at once be removed, thus reversing the practice of wearers of "vegetable fibre" clothing, who may march in their shirtsleeves, but must put on their coats when they rest, if they would guard against catching cold.

I have considered the question of summer and winter clothing at some length, and have found that it requires something more than an off-hand answer. If we turn to the feathered and hairy animals, we shall find that by no means all of them alternate light summer with thick winter clothing.

Among hairy animals, otters, beavers, and others that are amphibious, make no such change, neither do the genuine inhabitants of the desert; for I never observed anything of the sort among the antelopes and wild asses at the Vienna Zoological Gardens. Lastly, no such change, as a rule, takes place with birds. Thus, among animals provided with a special vesture, those most liable to exposure and climatic influences do not vary their clothing with the seasons. The only hairy animals with whom the change is really marked are those which live in the woods and fields; and that is quite intelligible.

When the woods are thick with foliage, and the fields stand under growing crops, these animals find themselves

no longer in the open air, but buried in the covert, and surrounded by a damp atmosphere, which greatly impedes the evaporation from their bodies. Nature has then placed these animals under a covering of leaf and grass, and the body naturally endeavours to lighten its clothing. When autumn scatters the leafy and grassy covering the case is reversed, for then heavier coats must counteract the exposure. With animals not liable to such alternations, and with the majority of birds, especially those always on the wing, this change does not take place.

In our climes, civilised man must be compared with the birds rather than with the animals of the field and forest. For, like the birds, both in summer and winter he is in the open air, and even when indoors he is surrounded by dry walls, and not by plants constantly throwing off watery vapour. Therefore observation of the animal world does not teach us to change our clothing according to the season.

The answer will be to the same effect if we consult men leading a comparatively natural existence. The shepherd opines "that which is good for cold protects against heat," and puts on his cloak when he feels too hot. In Hungarian pasture lands the shepherds wear the sheepskin bunda both in summer and winter, with the difference that in summer they turn the woolly side outwards, and in winter inwards.

XXXI.—THE SOLDIER'S UNIFORM.

WHEN persons suffering from disease or from tendency to disease adopt the Sanitary Woollen System they are usually delivered from such disease or tendency in a comparatively short interval, although sometimes a longer

period may elapse; while the deliverance is especially rapid if abundant bodily exercise be taken in the open air. As the military training secures this active exercise, the improvement in the health of the men during their military service (which, independently of my System, I statistically established in my book *Die Menschliche Arbeitskraft*) may be confidently expected under the Sanitary Woollen System to proceed more rapidly, safely, and thoroughly than heretofore. This would mean a reduction in the sick list, and in the losses through death or unfitness for duty. If it be replied that the army is not an institution devoted to purposes of cure, and that only healthy men are permitted to enter it, I would observe that the *tendency* to disease may yet be present in men admitted to the army.

In addition to the removal of this tendency to disease in a proportion of the men, the treatment of the men must be directed to getting them into "condition," *i.e.* to training and hardening them. The means by which this is accomplished in the army are the same as in the case of racehorses, *i.e.*, sweating induced by heating bodily exercise. Now, in training horses, experience has established beyond all dispute that the necessary degree of hardening is attained much more quickly and completely when the animal is covered with pure woollen clothing; and in England, where training is most practised, rowing, boxing, and other sporting men, train not only by means of sweating exercise, but also with help of the Sanitary Woollen System, *i.e.*, by wrapping themselves in wool during the exercise.

Clearly what is good for athletes and racehorses is also good for soldiers. The correctness of combining exercise with wrapping in wool is strikingly proved by the experience of myself and other Wool-wearers, that the pure Woollen clothing alone, without any aid in the form of enhanced bodily exercise, is able to procure nearly as high a degree

of hardening as bodily exercise not taken in conjunction with the Sanitary Woollen System. If considerable value attaches in time of peace to the quicker and more complete attainment by the soldier of a sufficiently trained condition, this is still more so during war, when it is of great importance that the new recruits, who enlist in a more or less enervated state, and require training, should be got into the necessary "condition" as quickly and with as little danger as possible.

The influence of the Sanitary Woollen System on the *effective capacity* in actual warfare is still more important. It renders the body *weather-proof* in a measure which is absolutely unattainable in other clothing. The wetting through of pure Woollen clothing is a matter of indifference to the body underneath it to an extent which astonishes everybody who observes it for the first time; and to this is associated the second pre-eminent advantage, that the clothing, after being wetted through on the body with rain, or with perspiration, dries with a rapidity (in 15 to 30 minutes when it fits closely to the figure) only attained with other clothing by hanging it before the fire. That Wool protects against cold need hardly be stated; but in face of the prevalent prejudice that wool is not suited to clothing in hot weather, it is necessary to insist with the utmost energy on the fact that clothing entirely of wool is as great a protection against heat as against cold, and assertions to the contrary are wholly ungrounded. If people would but *try* instead of talking, they would find that the freedom afforded to the passage of the exhalation from the skin by clothing *made throughout* of porous wool, prevents the feeling of oppressive heat which arises when the exhalation is confined by impervious clothing. The *surplus* heat is thrown off as fast as it is generated, while the *necessary* heat is retained, preventing chill. So much for the heat

generated by the body (of course clothing does not generate heat, but simply defends its possession). As regards protection against the heat of the sun, the non-conductive property of wool is the reason why ice when carried through the streets in summer is covered with woollen material. People should remember this fact when, in their ignorance of the true nature of the case, they say—"What! wear Woollen clothing in Summer, and sleep in Woollen Bedding! Why, I should melt!" No one will dispute that the much greater independence of climatic changes which the Sanitary Woollen System thus procures, constitutes a very appreciable advantage for the soldier on a campaign.

People engaged in sporting pursuits had found, before I introduced my System, that clothing made entirely of wool is not only suited to training purposes, but that the *physical endurance* of the body is much greater than in other clothing. There are four reasons for this: (1). Woollen clothing hinders the retrogression from the trained state which quickly sets in when the clothing is unsanitary, so soon as bodily exercise is suspended. The Wool-wearer keeps constantly "in condition." (2). A limit is set to physical performance by fatigue, which again is due to two causes,—the consumption of the material that generates force, and the formation and gradual accumulation of the products of decomposition, which, on account of their effect, have been termed "fatigue-matters." When the clothing is unsanitary, these matters, on their excretion through the pores of the skin, collect in the vegetable fibre, whence they exercise a laming effect upon the body. The Wool-wearer throws these matters off freely into the outer air, and the period when fatigue sets in is thereby delayed. Wool-wearers can therefore, *ceteris paribus*, without previous training, exercise, and execute marches and other physical performances, of which other people are only capable after

considerable practice and training. (3). Wool-wearers require much less time for recuperation of the energies than persons who are unsanitarily clothed, for in the case of the latter the removal of the fatigue-matters from the body is impeded by the quantity stored in the vegetable portions of their clothing. (4). Persons unsanitarily clothed carry with them in the vegetable material which they wear a constant cause of fatigue, and are therefore at no time so fresh, recuperated, and capable as Wool-wearers. If we apply these considerations to the military, there will be greater capacity for marching, greater endurance of hardships, and greater readiness for fighting on arrival at the battle-field, qualities which have long been considered by military men of the first importance.

There is a military proverb which enjoins "Cool blood and hot bullets." Presence of mind, or, in other words, stability of the emotions, is a military virtue which has not only been at all times highly valued, but which is especially necessary in the present mode of fighting. With the introduction of the repeating gun, the danger that troops, in their hurry and excitement, may aim badly and therefore without effect, or may fire away all their ammunition and thus become practically disarmed, is greater than at any previous period, wherefore cool blood plays an important part. Indeed, no officer will contradict me when I say that coolness is the foundation of all firing discipline, and not only regulates the activity of the soldiers, but is the indispensable proviso for the officer having his men in hand; while the value of coolness in close conflict needs no argument. That in pure woollen, compared with unsanitary clothing, the emotions are distinctly more under control, has been widely attested, and can easily be established by comparisons instituted among military men.

Most shooting parties afford evidence that, with equal

opportunities, the largest head of game is shot, not by the man who has the best gun, firing the longest range, but by the man with the steadiest hand. The same holds good in battle. I admit that when masses of troops are firing, the range and precision of the weapon outweigh the accuracy of aim of the individual. But in open file the steady hand is as superior to the better weapon as when shooting game. No one will deny that cool blood is necessary to ensure a steady hand. But apart from the consideration of the state of the emotions, experience has shown that the Sanitary Woollen System increases the steadiness of hand. Most of the communications which I have received on the point have been furnished by draughtsmen and other workers with the hand, but those which have reference to the special subject of shooting suffice to show that this advantage may be confidently expected to accrue from sanitary clothing.

No one will dispute that disease is a main enemy of campaigning armies. In this direction the influence of the Sanitary Woollen System is threefold. The greater power of resistance to weather influences affords increased security against chill-diseases and those of an inflammatory nature; the enhanced capacity for enduring forced marches, &c., lessens in an important degree the danger of the men becoming knocked up through over-exertion; and that the Wool-wearer's powers of resistance to infectious diseases are greater than those of people unsanitarily clothed has also now been sufficiently confirmed. This last advantage will of course be more apparent in the hospitals, but it will also tell indirectly before the enemy, for the removal of men to the hospital weakens the army as much as any other proportionate loss.

The advantage of purely Woollen over unsanitary clothing in cases of wounds would require too much space to be thoroughly reasoned out here, and I will therefore only

notice one or two points: (*a*) The vegetable portions of the clothing are impregnated with the self-poison of the body, and if such poisonous fibre be, as is commonly the case, torn into the wound, the latter is poisoned, and an unfavourable complication ensues. Wool, on the other hand, is not only free from the body's self-poison, but the fatty matter of the human perspiration which adheres to wool contains the salutary portion of the body's exhalation, and may be termed an antiseptic wound-salve, and if this enters the wound the effect is beneficial. (*b*) A very dangerous accessory to wounds is wound-fever. The fact that this does not accompany every wound shows that there must be a tendency to feverish sickening for wound-fever to develop. That this tendency is wholly removed, or weakened to an important degree, by the Sanitary Woollen System is among my commonest experiences, and when the tendency is present an early result of adopting the System is one or more fever crises, after which the Wool-wearer becomes "fever-proof." It follows that the tendency of the Wool-wearer to wound-fever is also less. I could adduce several other points, such as greater security against excessive loss of blood, diminution of the extent by which the entire body is affected by wounds, so that the Wool-wearer is not so easily placed *hors de combat* by light wounds, &c.; but enough has been said to direct attention to this side of the subject.

Having, I trust, made out a sufficient case to show that my reforms deserve the full consideration of the heads of the army, I proceed to discuss the ways and means of carrying these reforms into practice.

It may be answered that, *in time of peace*, the advantages which I have cited for the Sanitary Woollen System are, from a purely military standpoint, inconsiderable, because the sick are sent into hospital or are discharged from the

service, their places being filled by healthy recruits. *In time of war*, as in 1870, the soldiers can be supplied with Woollen shirts, which the great resources of the woollen industry can quickly place at their disposal, and then the army will enjoy the advantages of the Sanitary Woollen System.

As to the rapid delivery of an immense quantity of Woollen shirts *of the right quality*, I have my modest doubts, but, assuming such delivery, it is a great error to suppose that with these shirts the clothing of the army will be all at once reformed. This error rests on a widely-spread misapprehension of what I mean by my System, for which I claim the advantages cited above, on the following basis, established by experiments which can easily be repeated, and by thousandfold experience.

1. The virtue of Wool has long been recognised, but what has not been recognised is that vegetable fibre, when employed as clothing material, is an element of positive injury to health, and is especially prejudicial to the "condition" of the body, because, owing to its attraction for the body's self-poison, it becomes actually poisonous itself. I will here just say that uncleanliness in clothing has been at all times considered injurious to health, and the necessity for the constant cleansing of the clothing has been admitted. This is tantamount to an admission that the dirt in the clothes is something injurious, and therefore poisonous. Further, it is matter of general experience that clothing of vegetable fibre, whether worn as Underclothing or as Outerclothing, much sooner needs cleansing than Woollen fibre, which again is tantamount to an admission that the unwholesome element which characterises unclean clothing is to a much greater degree situated in the Vegetable than in the Woollen parts. The conclusion necessarily follows that the Vegetable parts of clothing,

compared with the Woollen, constitute a danger to health, and that their removal is a hygienic advantage. To come at once to the military aspect of the matter, while it is conceivable that soldiers in barracks may have sufficient time and means for cleansing the Outer- and Underclothing, this will not be so during a campaign, when frequently even the cleansing of the Underclothing is impracticable, to say nothing of the treatment necessary for the Outerclothing, referred to below. Therefore at the most important period, the deleterious effect of the unclean Vegetable portions of the clothing on the soldiers' health and capacity is enhanced.

2. The principal danger from dirt in the ordinary clothing of the present day consists less in the employment of Vegetable fibre for Underclothing, than in *lining* the Woollen Outerclothing with materials of Vegetable fibre. The cheapness of vegetable Underclothing and its light weight make it easy to have sufficient at hand to provide a change. As the web is very thin, and the material quickly dries when hung up, there is no great obstacle to maintaining it sufficiently clean. But with the Outerclothing it is a very different matter. The mistaken notion prevails, that because the Outerclothing does not come in contact with the skin it cannot, like the Underclothing, be fouled by the skin's secretions. Yet everyone knows that the perspiration does not stop in the Underclothing, but also penetrates into the vegetable fibre with which the Outerclothing is lined; and as the perspiration conveys from the body its self-poison, this is deposited in the Vegetable fibre. Further, the body's self-poison is not only conveyed in the perspiration, but in the invisible gaseous exhalation as well, which also reaches to the Vegetable lining of the Outerclothing. If such lining be examined, in a very short time the same dirty discolora-

tion as in the Vegetable fibre shirt will be noticed to commence, even when there has been no abundant flow of perspiration. As regards the cleansing of the clothing, it may first be stated generally, that Woollen fibre is not easily penetrated by the body's self-poison, nor by other extraneous matters which are soluble in water; it can only be dirtied on the *outer surface* of the fibre. For this reason Woollen fibre can long be maintained sufficiently clean by *dry treatment*, such as brushing, beating, and so on, although, of course, cleansing with water must ultimately be resorted to. Vegetable fibre, on the other hand, absorbs into its interior dirt and poisonous matters which can then only be withdrawn by means of *wet treatment*, *i.e.* by washing. Let us now consider the treatment of the Outerclothing. While the Woollen outer material can be maintained during many weeks sufficiently clean by dry treatment, the lining and other parts of vegetable fibre should, from a hygienic point of view, be washed nearly as often as the linen shirt is changed. This would hardly be possible for soldiers in times of peace, and would be out of the question in a campaign, because there is not the necessary supply for frequent changing, and Outerclothing so lined takes long to dry; moreover, there would be the objection, even in times of peace, that with the method of washing necessary to cleanse the Vegetable fibre lining, the Woollen outer material would suffer to a disproportionate extent. For these reasons, so far as I am aware, the Outerclothing of the soldiers is in times of peace only washed once a year, which is, of course, much too seldom when it is lined with Vegetable fibre. Most private persons, on the other hand, entirely neglect the regular washing of the Outerclothing; they are satisfied to keep up external appearances by brushing the outer woollen material, and continually carry with them the dirt and stench which are located in the

coat linings and padding, under the delusion that it does not injure them, while others cannot see it. That they are under a delusion can be shown by a simple experiment. Remove from a coat of pure woollen outer material, which has been worn, and of which the lining is dirty, the lining of one sleeve, leaving the other sleeve untouched, and wear the coat so. Even the dullest person will be convinced that the arm in the sleeve without lining is more easy and comfortable, is warmer in winter and cooler in summer, than the arm which is still subject to the poisonous influence of the vegetable fibre lining. If this experiment does not suffice, it may be carried further, and the lining removed from one side of the body of the coat, the other side being left intact. Whoever after wearing this does not admit that the vegetable fibre lining of the coat is loathsome and injurious to health, deserves to end his days in vegetable fibre.

Thus everyone can easily ascertain for himself the positive harmfulness of lining of vegetable fibre in the Outerclothing; indeed it is the most harmful element in our modern dress, and the above hypothesis—that it would suffice in case of war to provide the soldiers with woollen shirts—is a mistaken one, for the following reasons:—

1. There would remain the injurious influence of the vegetable fibre, which is usually present in the military coat in the shape of especially heavy linings and even of padding.

2. This injurious influence would be enhanced, for the skin is maintained at a higher temperature by the woollen shirt, and is also stimulated by the wool, so that it acts more freely, throwing off a greater quantity of water and vapour, and increasing the proportion of self-poison which it excretes (with corresponding diminution of the proportion excreted by the kidneys, intestines, and lungs). Conse-

quently the vegetable portions of the Outerclothing become not only sooner, but more abundantly, saturated with self-poison than if the Underclothing had continued to be of vegetable fibre. The following experiment could be made: Coats freshly lined with the customary material of vegetable fibre might be given out to a number of men, half of whom should wear woollen shirts and the other half cotton. After a few days' wear it will be clear, both to the eye and to the sense of smell, that the lining worn over the woollen shirt has become much dirtier and more offensive than that worn over the cotton shirt.

3. When the coat lining is unsanitary, the woollen shirt causes the air within the clothing to contain a greater proportion of moisture, especially, of course, in warm weather and when perspiration is induced by exercise; this moisture is more lasting, because the vegetable lining of the coat, when wet with perspiration, dries very slowly, and is impervious to vapour. The consequence is that the outer skin becomes softened, enervated, and sensitive, and of course this sensitiveness is felt when the body is exposed; if the blood be impure, this condition of the skin may reach a point at which troublesome eruptions ensue.

The assertion is frequently made that "wool is enervating," which is true, especially in respect of the skin, when wool is worn under a coat lined with vegetable fibre, and of course in a yet greater degree when wool is worn, not only under the unsanitary coat, but also under a shirt of vegetable fibre. *This, however, is precisely the mode of clothing the body against which I contend.*

I have established by experiments, that if, in the first place the shirt, and in the second place the coat-lining, of vegetable fibre be discarded, leaving both under and outer-clothing *wholly* of wool, all these objections cease. The

self-poison and watery vapour pass freely into the air, without any diminution of the skin's activity; the coat and shirt dry, when wetted by perspiration or rain, with the greatest rapidity, and the skin as rapidly attains the necessary dry state, thereby ceasing to be sensitive. In short, only clothing which is partly or wholly of vegetable fibre enervates, whereas *entirely* woollen clothing, when not too thick and impervious, hardens the body almost as much as if clothing were dispensed with altogether.

4. Let experiments be made as to how the men themselves *feel*, first in a coat lined with vegetable fibre, and woollen shirt underneath; then in a coat similarly lined and cotton shirt underneath; then in a coat without lining and cotton shirt; then in a coat without lining and woollen shirt. Let the men march and exercise, and the question will very soon be settled in favour of the last-named method as the only correct one, next to which—but a long way off—comes the cotton shirt under a coat without lining of vegetable fibre. How is it that all who engage in athletic sports, and many who shoot, or make lengthy walking excursions, instinctively select pure woollen clothing, without lining? What is good for athletes and sportsmen must certainly be the best for soldiers.

On this matter there is no room for doubt, and simple experiments will serve to show that, from a hygienic and hardening point of view, the practice of lining, and still more of padding, the outerclothing with linen and cotton materials is to be condemned, whether the shirt underneath be of vegetable fibre or of wool. It is equally easy to establish that, if it be intended to procure for soldiers in a campaign the advantages which are now on all sides admitted to accrue from the woollen shirt, *the removal of the coat lining of vegetable fibre is indispensably necessary*, especially in the warm season.

Another question is, whether the lining of the uniform

coat is necessary from mechanical considerations. It is said that woollen material easily tears, and that the firm lining of vegetable fibre supplies the requisite resistance. I may mention, in the first place, that the lining of uniforms is not deemed necessary in all armies; for instance, the Austrian soldier's uniform is not lined. Admitting, however, that a coat not lined has less resisting power than a coat which is lined, the following has also to be borne in mind: The wet sole of a boot wears and tears much more quickly than a dry sole, and the same is true in relative degree of woollen material; other things being equal, the coat which dries quickest will last longest, and that is the coat without lining.

Moreover the mal-odorous self-poison absorbed by the lining of vegetable fibre is favourable to the growth of fungi which cause rotting, as is also the presence of a sufficient amount of moisture. As vegetable fibre does not contain nitrogen, it is scarcely susceptible to the ferment of rot,* and therefore the lining of the coat is not directly affected; on the other hand wool, which contains nitrogen, is well known to be capable of rotting, but, in addition to moisture, there must be the co-operation of mal-odorous matters. As wool does not absorb such matters, one of the conditions necessary to the process of rotting is wanting, even when the wool is wet; but this condition is at once supplied when the woollen material lies on material of vegetable fibre which is saturated with mal-odorous matters, and when both are wet. Comparison between clothing with and without lining of vegetable fibre shows that the well known tendency of the woollen material to rot and wear away under the armpits of coats and the fork of the trousers is not a

* The chemical decomposition of vegetable fibre on the body is not due to the effect of ferments, but to the acids of the perspiration.

consequence of greater friction in those parts, but of a process of rotting due to the vegetable fibre, which remains longer wet and mal-odorous. Woollen clothing without lining of course also wears out earlier in these parts than in others, but it lasts very much longer than the lined clothing. This is because the separate woollen threads in the latter become rotten and brittle, while in clothing without lining of vegetable fibre the threads retain their undiminished strength, and it is clear that a sound thread will resist longer than a rotten one. This is the experience of all who have adopted my Sanitary Woollen System. If to the foregoing be added that the uniform-coat which is lined with vegetable fibre must from time to time be washed, if it is not to lapse into an insufferably disgusting state, while a similar garment without lining can be maintained clean for a much longer period by dry treatment; and if we consider that the wet treatment which the lining of vegetable fibre necessitates injures the durability of the woollen outer-material—the assertion of the greater durability of the coat with vegetable fibre lining falls, in my opinion, to the ground.

I shall be told that, especially in the cold season, the lining of the coat affords greater protection against cold. This my experience enables me to most distinctly deny. *Wool always feels warm, vegetable fibre feels cold.* In clothing which combines wool with vegetable fibre, the vegetable portions are not a factor for keeping the body warm, but for making it cold, diminishing the warming influence of the wool. Myself and the adherents of my System have found that a woollen coat without lining keeps the body as warm as a woollen coat and overcoat together, when both the latter are lined with vegetable fibre. What has just been stated about the chilling influence of vegetable fibre in a dry state applies in a much greater degree still, so soon as it

is wetted by rain or perspiration, when it becomes "icy" to the touch, whereas clothing wholly of wool never causes this feeling.

It will perhaps be contended that, while an unlined coat may do well enough when the air is calm, the wind penetrates much more sharply through it than when it is lined. This, of course, cannot be disputed, but the main point lies in the behaviour of the skin; we see that the skin of the face possesses in its power of enhancing its circulation of blood, a means of defence against the influence of the wind. The skin under the clothing does the same, provided that it be not hindered by some other influence, such as that exercised by the self-poison in lining of vegetable fibre. If this be removed, the skin of the body will perform its function equally well as the skin of the face.

By this I do not mean to say that the necessity will never arise for more and thicker clothing, but this can be provided in another and a better than the ordinary way. If a thin woollen jacket, weighing no more than the coat lining, be worn between coat and shirt, it will maintain the temperature of the body far more effectually than a lining of vegetable fibre, with the advantage that the jacket can be removed when not required. I do not even consider that soldiers require such jackets, for they have their overcoats or cloaks. If these be unlined, the cold must be very extreme for them to suffer inconvenience, and in a campaign like that of 1870, such jackets as I have described could, without great difficulty, be dispatched to the army.

It is sometimes said that no uniform-coat will fit neatly and closely to the figure unless it be lined. This I will not altogether deny: the Austrian soldier's uniform-coat without lining sits more loosely, more like a blouse, than the German uniform. Nevertheless, I submit the following considerations:—

1. The matter can only be regarded from this point of view in the case of soldiers on parade, not when they are on a campaign. The soldier fights with aid of the forces of his body, and even if a smart appearance is not without its effect on the enemy, this advantage must not be acquired at the cost of bodily disadvantages.

2. If elastic diagonally woven cloth, or the stockinet material used for riding-breeches, were used for uniforms, instead of the usual cloth of rectangular web, the coat could be prevented from either looking like a blouse, or from easily bursting through fitting too tightly. Material suited to closely fitting riding-breeches is also adapted to closely fitting uniforms, which are desirable for hygienic considerations as well as for their smarter appearance.

I now come to the question of pounds, shillings, and pence. It would certainly be the ideally best plan to thoroughly carry out in the army what I have called the Sanitary Woollen System—pure woollen outer- and under-clothing, pure woollen bedding, and sleeping with open window—but this, of course, would involve a certain expense. My proposal, however, to remove the lining of vegetable fibre from the outerclothing—the coat, trousers, and cloak—involves a *saving*, a less expenditure, not a greater. The cost of manufacturing the uniforms will be less if the lining be left out, and the labour and expense which *should* be incurred for cleansing the lined clothing will not be required. The saving thus effected may be applied in procuring still stronger cloth than is at present used, if the durability without lining be questioned, a point already dealt with in this chapter.

As regards experiments which may be instituted in order to practically test the clothing reforms comprised in my Sanitary Woollen System, it is of the highest moment that they should be exactly and scientifically conducted.

I have heard of experiments made by simply putting men into woollen shirts, without even giving any consideration to the enormous hygienic difference between a dyed flannel shirt and an undyed stockinet shirt. The first and most important step in such experiments should be the removal of all vegetable fibre from the outer-clothing, and when the advantages of this course have been established, the other reforms comprised in the Sanitary Woollen System may be undertaken. The question of the form which the clothing of the legs should take is fully discussed in the chapters on "Trousers or Breeches," which I earnestly commend to the consideration of military authorities.

XXXII.—SANITARY BEDDING AND BEDROOMS.

THE great hygienic value of this most important part of the Sanitary Woollen System cannot be exaggerated, and will be apparent to everyone who weighs the following considerations: In its day-clothing the body is more or less in an active condition, whereby the exhalation from the skin is enhanced, and the ventilation of the atmosphere in the clothes is facilitated. Of course, matters are produced which are due to the fatigue which results from this activity, and which must be removed, but the increased exhalation from the skin, and ventilation of the atmosphere in the clothes, sufficiently carry away the noxious portion of the exhalation.

On the other hand, the condition of absolute repose in bed is much less favourable to the removal of noxious exhalation. If a person be confined to his bed by disease, what does it avail him that his day-clothing is sanitarily

correct? It is palpable that in cases of disease it is especially important to secure the healthiest conceivable conditions, and that the consequences of lying in a bed which holds the disease-matters fast, instead of letting them pass away and disappear in the air, must seriously retard, if they do not prevent, recovery. Further, the occupant of an unsanitary bed is much more reluctant to have the window open, to lie close under it, and to let the fresh air exercise freely its purifying effect; because the gratification of the desire which the unsanitary bedding creates to throw off the coverings may set up a chill. Moreover, even if patients in unsanitary bedding could be thus brought to the fresh air, the best air in the world would be at once vitiated by that reservoir of noxious odours, the unsanitary bed.

Before proceeding further to discuss the subject of bedding I will say a few words as to the night-clothing. This should of course be of undyed porous wool, and I recommend for men a costume in the nature of Pyjamas. Sleeping suits have been constructed, consisting of jacket and pants with feet, either knitted or of the stockinet material. These suits afford more protection to the body than the loose woollen night-dresses, especially on quitting the warm bed, when the heat of the body attracts a rush of cold air up a loosely-fitting garment. Another alternative is to wear at night a change of day-shirt, drawers, and socks, and the comfort of this costume is only inferior to that of the sleeping suits.

The reasons for condemning from a hygienic standpoint the bedding hitherto in general use, are—firstly, the employment of linen, cotton, and hemp materials for the sheets, mattress, coverings, stuffing, &c.; secondly, the use of dyed blankets, and blankets not wholly of wool; thirdly, the objectionable practice of not only dyeing the

horsehair stuffing of mattresses and bolsters to make it nicely uniform, but even of adulterating it with vegetable fibre. Further, the manufacture of wooden bedsteads with the inner, unseen parts left untouched with oil-paint, varnish, or some other material to effectually close the pores of the wood, so that these cannot absorb evil odours and give them out again under changes of temperature and of degree of moisture; the placing of the bed in an unventilated corner of the room, and anxiously keeping the windows closed; the practice in winter, if a sitting-room adjoin a bedroom, of warming the latter by permitting the access of the vitiated air from the former; all these errors and bad practices constitute the ordinary bed a breeding-place for maladies, haunted by all the diseases which have in course of time been gone through in it, and which treacherously lie in wait for the moment when, favoured by warmth or humidity, they may attack the unsuspicious sleeper.

In contrast to the unsanitary practices just denounced, I will make the following brief suggestions: The sleeping-room should be airy, sunny, and on no account in dangerous propinquity to a water-closet. It should not be papered, but the walls should be sized, or better still, whitewashed. The furniture should be wholly of sanitary construction (see Chapter 43). This, of course, especially applies to the bedstead, as already explained, and here metal is to be preferred to wood as well on economical as on sanitary grounds. The position of the bed is also very important. It should not be placed in a corner of the room; a better arrangement is the foot-end against the wall, so that the head lies in the more open portion of the room; but by far the best position for the bed is with the head close to the window, so that the respiratory organs, and indeed the entire body of the sleeper, benefit at first hand by the

fresh air. It of course follows from this that the window must be left open at night, and to this end the best construction of window is that which pushes up or down (as in England), and not that which opens sidewards (as is usual on the Continent). The curtains or blinds to all the windows should be of wool, and the wool should be undyed. It must be apparent to every one who has attentively considered what I have already stated, that curtains or blinds of vegetable fibre, especially those through which the fresh air must pass before it can be breathed, would exercise a deleterious effect.

As material for the bed furniture and bedding, only substances of horn or of animal fibre should be employed, such as wool, hair or feathers. These substances, when undyed, attract by preference among the various exhalations from the body the fragrant, musk-like, odorous matters which constitute the healing power of our own nature, whereby, according to the simple laws of the diffusion of gases, these matters are saved from waste, and the sleeper is placed under the beneficial influence of the body's self-medicine. These materials of animal fibre, moreover, reject the mal-odorous exhalations, which constitute the body's self-poison, *i.e.*, they permit their free passage into the surrounding atmosphere, and consequently the unhampered exhalation of the body, again according to the laws of the diffusion of gases. In order to secure these highly important sanitary qualities, the material of the bedding should be practically undyed throughout. As hygienic considerations are far the most valuable in the case of bedding, and ornament can be supplied by a coloured covering which may be removed at night, artificial dyes should, in accordance with what is stated in Chapters 37–38 on that subject, be as much as possible avoided. At the same time, by the employment of black, brown, yellow

and white animal fibres, a variety of effect can be obtained without the use of artificial dyes.

Where the interior structure of the bed consists of a wooden frame and linen or hempen bands, the former should be treated with shellac, or the pores of the wood be otherwise entirely closed, and the latter should be impregnated with refined paraffin, as also the twine or other material used for connecting the bands with the frame. The impregnation must be done carefully, or the paraffin may soil the woollen materials with which it comes in contact. Some very strong woollen material should be placed on the bottom of the bed to protect the mattress. The necessity for treatment with paraffin is, of course, avoided when the mattress rests on springs of wire-netting, as in most modern iron bedsteads.

Respecting the MATTRESS there is little to be said, except that it must conform to the principles of pure wool throughout, and of freedom from dye, which underlie the Sanitary Woollen System. The division of the mattress into three sections is not only to be recommended, but is really necessary, as unless the relative positions of the different sections are frequently changed, that portion which carries the main weight of the body must soon become hard by compression. When, notwithstanding the frequent changing of the sections, this hardness makes itself apparent in course of time, the mattress must be opened and the stuffing loosened.

The PILLOW is sanitarily the most important part of the bedding, and is even of more consequence than any portion of the day-clothing; for the odour, good or bad, with which it is impregnated is continuously inhaled during the considerable number of hours that the bed is occupied. Hence, the pillow should conform with the greatest precision to the principles as to material and dye laid down in the

Sanitary Woollen System; if it is desired to be especially soft, the natural coloured woollen covering should be stuffed with undyed feathers; otherwise the stuffing should be of pure undyed wool.

Pillow cases and sheets can be made of light natural brown material or of white cashmere. The latter is perhaps more elegant, but the former is warmer and more pleasing to the touch, and therefore more to be recommended.

With two or three of the natural-coloured coverlets or blankets of camel hair or sheep's wool, or a "sleeping-sack," the bedding, at least for healthy, vigorous persons, is complete. Persons who from any cause have greater need of warmth should apply the additional woollen coverings requisite to obtain a comfortable temperature. It is neither necessary nor useful to feel cold, for the idea that it is possible thereby to become hardened, and accustomed to cold, is erroneous. To maintain the body warm the covering need not be of equal density at all points; it is much better to place two- or even three-fold covering over the feet and legs, up to the knee.

The use of materials of camel hair in bedding is not only technically quite practicable, but is hygienically strongly to be recommended. Wide experience has shown the camel hair bedding to have important advantages over that made of sheep's wool or other animal fibre.

1. Camel hair surpasses sheep's wool in indifference to the mal-odorous and soiling portions of the exhalation and secretions of the skin, *i.e.*, it allows them to escape still more thoroughly into the air and become innoxious. Camel hair bedding thus remains longer clean and free from all evil odour than sheep's wool, which is not only a hygienical, but also an economical, advantage.

2. The peculiar mild, delicate, specific odour of camel hair acts like an opiate, and induces, after the bedding has been

some time in use, a more quiet and deep slumber than the sheep's wool bedding, whence it is especially to be recommended to persons who sleep uneasily or suffer from sleeplessness.

3. The camel hair bedding is even cooler in summer and warmer in winter than the sheep's wool bedding. Camel hair furnishes most excellent coverlets and "sleeping-sacks;" if it feel somewhat cold at first, this should not be allowed to mislead, as it becomes exceedingly agreeable to the sleeper so soon as it is impregnated with the "salutary" portion of the body's exhalation (see "Camel Hair," Chapter 47).

The objection is not infrequently made, that those who adopt the Sanitary Woollen Bedding will be in a difficulty when sleeping away from home. This difficulty is much more apparent than real, and may be overcome by the use of the "sleeping sack," or by the sleeper wrapping himself in one of the large sized Sanitary Woollen coverlets or rugs. Thus enveloped, his body is preserved from all contact with the blankets of the bed on which he is lying. He will probably find two blankets above the sheets of the bed, and can insert himself between them, enveloped in his rug. Especially in strange beds is the Sanitary Woollen System of inestimable value, *as it effectually guards against risks from damp bedding.* To this danger, which may, by oversight, arise even in the most careful household, travellers are especially exposed; and innumerable cases of rheumatic fever, &c., with their always disastrous, and frequently fatal, consequences, caused by sleeping between damp sheets, would have been avoided under the Sanitary Woollen System.

XXXIII.—THE OPEN BEDROOM WINDOW.

A BOOK might easily be written on the immense advantages attending the practice of *always* sleeping with the bedroom window open, and on the great disadvantages which arise if this rule be neglected; also on the progress which has been made in the treatment of disease, since it has been recognised as a prime necessity of life and health that the atmosphere immediately surrounding the body should freely mingle with the open air.

It cannot be too often insisted upon that the body will not be hardened, or empowered to resist the attacks of disease, unless there be thorough ventilation of the bedroom. To insure this, in mild and quiet weather, two windows should be open at top, when more than one person is sleeping in a room. But however cold or severe the weather, one window should always be open at the top, although the air can be prevented from blowing on the sleeper by the interposition of a blind or a curtain. To endeavour to ventilate a bedroom by an open window in an adjoining room is useless, as will quickly be recognized by the nose, which is the best test as to whether a room is properly ventilated.

If on returning to a bedroom in the morning from the fresh air it is found to be in the least stuffy, the ventilation is insufficient. Nor is this stuffiness merely a sign that the air is impure; the odorous matters whose presence it indicates are the "noxious" elements of the body's exhalations, and have a distinctly deleterious effect when they are inhaled with the atmosphere which they pervade. Various unfounded objections have been raised, tending to establish the injurious qualities of the external atmosphere

when breathed at night by sleepers. For instance, it is stated that the night air is laden with carbonic acid, which is dangerous to the breathing passages when inhaled. In making this assertion the fact is overlooked that the breathing passages invariably contain air charged with 4 per cent. of carbonic acid, while the proportion in the night air is at most 4 per *thousand!* I myself have made the experiment of charging the atmosphere with carbonic acid up to 1 per cent., without in the least affecting my breathing. On the other hand, if the water that streams down inside the window of a closed sleeping-room be collected, one drop of this liquid, impregnated as it is with the "noxious" exhalations given off by the sleepers, will suffice to poison a rabbit, as has been shown by actual experiment. Those who have adopted the Sanitary Woollen System do not perspire at night, and are not subject to the chills of which persons clad in linen and sleeping in sheets are so greatly in dread. The woollen clothing and bedding afford ample protection; and if the head, from baldness, or the thinness of the hair, be especially sensitive, some extra light woollen covering may be provided for it. The difference in the effect on the spirits, and in the refreshed, instead of jaded, feeling on rising from bed, when, by means of the Sanitary Woollen clothing and bedding, and the open window, the "noxious" exhalations of the body are allowed to pass freely away, instead of being inhaled over and over again, can only be appreciated by those who have tried it. Children no longer toss about in their beds and throw off the clothes, leaving the lower limbs exposed, while the face and hair are clammy with perspiration. In the hottest nights they lie cool and comfortable, just as they went off to sleep.

XXXIV.—THE CLEANLINESS OF THE SANITARY WOOLLEN CLOTHING SYSTEM.

THE worst description of dirt is that which is offensive to the senses. Linen and cotton, whether worn as underclothing or used for coat linings, etc., acquire an unpleasant odour, as may easily be ascertained; so that even persons who put on clean shirts every day must continue unclean in one respect, for the coat lining cannot be washed, and constantly gives off its offensive smell. The Sanitary Woollen clothing need inspire no fear on the score of cleanliness in this respect, as it acquires and retains a pleasant smell. When the clothing has been worn some time it may be laid in the sun, or shut up with camphor, when it will be found to have parted with any excess of emanations which it may have absorbed from the body through lengthy wear.

Then there is the dirt that takes the form of dust, which settles in woollen garments more readily than in others; but this is compensated by the advantage that it can also be more easily removed. A linen dress covered with dust must go to the wash, whereas brushing and beating will take out all the dust in woollen clothing.

Dirt in the form of grease from the animal fat secreted by the skin only presents itself if the Sanitary Woollen shirt be worn for an unduly long period, because it does not take up and fix cutaneous secretions with the same tenacity as linen or cotton shirts. This brings me to consider the dirt that accumulates on the skin. In this respect Woollen shirts are truly incomparable. Whereas shirts made of vegetable fibre material attract all the dirt of the skin, converting it into a species of grease to be again deposited in

a crust; the Sanitary Woollen shirts brush off the dirt in the form of dry dust so thoroughly that, in a fairly pure atmosphere, the body looks and is as clean as though fresh from the bath.

To sum up, every one is unclean who neglects to wash when dirty, but everyone is clean who *avoids dirt;* and, as the body collects much less dirt in the Sanitary Woollen Clothing than in cotton or linen, the inference is clear that, other conditions being equal, wearers of the former are much cleaner than those who adhere to material made from vegetable fibre.

XXXV.—THE CLEANSING OF THE CLOTHING AND BEDDING.

MY assertion that, when the clothing is of pure wool *throughout*, the Sanitary Woollen shirt can be continuously worn for a comparatively lengthy period has been misrepresented as a direct recommendation to do so, and the endeavour has been made to found on it a charge of want of cleanliness against the Sanitary Woollen System.

Whoever takes the trouble to understand my System will at once see that it is the exact converse of encouragement to uncleanliness, in that it directly combats the factor which is deposited as dirt in the clothing; for I require that vegetable fibre, which catches and retains dirt, should be replaced by animal wool, which does not retain the dirt secreted from the pores of the skin, but allows it to freely exhale and pass away. The two-fold consequence is:—

1. Clothing constructed on these principles remains clean very much longer than unsanitary clothing, in proportion as the Sanitary Woollen System is strictly adhered

to. Time and money are wasted, and the garment is subjected to unnecessary wear and tear, when it is sent to be washed before it is dirty; for clothing is not only clean when it has been washed, but also when it has not been made dirty.

2. It follows from the foregoing that I urge immediate cleansing of the clothing when, notwithstanding its nature, it has become dirty; thus I am as energetic an advocate of cleanliness as any other writer on hygiene.

It should, moreover, be borne in mind that linen and cotton dresses are called "washing dresses," as distinguished from woollen, which may be termed "brushing dresses." With the former brushing is of no avail, and they must be continually washed, while wool, in eight out of ten cases when vegetable fibre would require washing, may be wholly freed from dirt by brushing or beating. To insist on washing a woollen shirt as often as one of linen or cotton would be just as absurd as to say that, because a cotton dress must be washed after wearing it for a week, a cashmere or cloth dress must be washed as frequently.

The linen or cotton shirt becomes unwholesome in two or three days, or, after copious perspiration, in as many hours, and the feeling of discomfort and aversion which it sets up in the skin tells the wearer that the shirt must be washed. It must not be supposed, however, that, apart from other considerations, the Sanitary Woollen Shirt could be worn unwashed *ad infinitum* without a similar sense of discomfort setting in: this must come at last, although the period which would elapse before it would be felt is considerably longer than with a linen or cotton shirt.

As regards the outerclothing, whoever, like myself, has worn such of linen or cotton, knows that after a few days it requires washing. Ordinary woollen outerclothing is made externally of wool, and internally is lined with

vegetable fibre. The outer woollen surface is much less liable than vegetable fibre to attract dirt; and as most people are chiefly concerned for their exterior, they seldom or never cause the outerclothing to be cleansed, not considering that a regular Augean stable of offensive odours collects in the linen and cotton linings, endangering the health.

This condition of things has been improved by the Sanitary Woollen System, which discards the offensive vegetable fibre. But, even so, perfection has not been attained, and there comes a time when the degree of concentration of the accumulated odour of the body's exhalations in the Sanitary Woollen outerclothing necessitates that this should undergo a cleansing process. I refer the reader to my remarks on the concentration of odour, in the chapter on "Disease and Health" (page 6). The only difference between outer- and underclothing in this respect is that the latter requires cleansing sooner than the former.

The relation which this question bears to that of the effect of colours on health, which I discuss elsewhere, is simple. The colour of the outerclothing is not the sole, but an essential, factor as to how soon the necessity for the cleansing process will arrive; and my investigations leave no room for doubt that from a hygienic point of view, the necessity is greatest with black colour or dye, and least with wool which is completely free from dye. As natural wool is white and brown, and white wool *appears* sooner to require cleansing, the highest rank must be awarded to natural brown wool.

The practical question for present consideration is when and how should the outerclothing and bedding be cleansed?

As to when; I answer, so soon as there is reason not to

feel completely satisfied respecting the health and general condition, whether the complaint be termed headache, toothache, heartburn, rheumatism, catarrh, sleeplessness, disinclination to work, etc. As to how; if the clothing or bedding be dirty, it should be washed. If, however, it is free from apparent dirt, deodorization with ozogen (or effectually and more cheaply with camphor) will suffice. The process is the simplest conceivable. The bedding can be placed in the morning in a chest in which camphor has been deposited, or ozogen has been sprinkled. Two hours before bedtime the bedding should be taken out, to allow the smell of camphor or ozogen to evaporate, and the process is finished. The clothing may be placed in a receptacle overnight with camphor, and in the morning it will have been cleansed.

The outerclothing made from material of rectangular web should from time to time be washed. In America the washing of the men's clothing is very properly considered indispensable, and is undertaken at regular intervals by the housewife.

A particular form of brush has been devised for manipulating the Sanitary Woollen Outerclothing. It offers the great advantage that by a special, patented method of treatment, the bristles in the brush are rendered very soft, and that thus many more bristles can be inserted in the brush without making the latter hard. The effect produced by using such a brush is much greater than with one of the ordinary construction, and the separate bristles are better able, because suppler and finer, to penetrate the depths of the web and to cleanse it thoroughly.

XXXVI.—VEGETABLE FIBRE, WHEN AND WHY UNSANITARY.

THE sanitary objections to materials of vegetable fibre are patent from the following facts :—

1. Every sick person gives forth a mal-odorous exhalation ; a proof of this is afforded in the attraction of flies, which are allured by matter which has become mal-odorous.

2. An offensive atmosphere, especially when it has become so through human exhalations, is a well-known cause of illness.

3. Bacteria are "koprophilous," parasites, which multiply in solutions of offensive-smelling nutriment.

4. *Living* plants are "koprophagous," attracting all evil odours, and assimilating them. The effect of vegetation in purifying the air has long been recognised.

5. *Dead* vegetable fibre has a similar power of absorbing evil odours; as, however, it cannot *assimilate* them, the ordinary laws of gas-absorption prevail, *i.e.*, the absorption is greatest under conditions of cold, and the odours are again exhaled when the fibre is warmed or wetted. Clothing, bedding, and generally all material, of vegetable fibre, while cold (*i.e.*, not in use), and when placed in the atmosphere of human beings, attract the mal-odorous exhalations until no more can be absorbed ; as soon as such clothing, bedding, etc., come in contact with the warm body, these emanations are given off in proportion to the degree of temperature. This directly induces spasmodic action of the capillaries of the skin (feeling of chill), and the atmosphere breathed is corrupted. Both effects are intensified when the fibre is damp ; wet, unvarnished or unpainted wooden floors, and damp linen or cotton shirts, or bedding are notoriously dangerous to health.

6. Just as living animal substance, when at rest, stores up oxygen, so, under similar conditions, it stores up the noxious emanations proceeding from the digested food; but while the chlorophyll of living vegetable fibre assimilates such emanations, the living animal substance does not possess that faculty. These noxious emanations therefore readily become disengaged in the body, especially when there is excessive internal heat, and permeate the tissues and juices, inducing similar phenomena to those caused by the direct inhalation of mal-odorous air, viz., spasmodic action of the capillaries of the skin, with feverish shivering while the spasms last; further, the insufficient throwing off by the skin of the internal warmth is felt, when the spasms subside, as febrile heat on the surface. The retention of the noxious emanations which proceed from the digested food is thus tantamount to disposition to feverish sickness.

7. The retention of the emanations which proceed from the digested food also gives rise to the so-called ferment diseases, as they impart to the juices of the body the fœcal taint which these "koprophilous" ferments require.

8. Whoever, therefore, uses clothing and bedding of materials of vegetable fibre not sanitarily treated, is continually exposed to the danger involved by the retention of the emanations from the digested food; and this danger is avoided so soon as use is made of animal fibre only, or of such vegetable fibre as has been impregnated with fatty or resinous matter (in short, with matter which is not soluble in water), and has thus been rendered incapable of absorbing evil odours.

XXXVII.—SANITARY COLOURS OR DYES.—I.

THE difficulties which surround the investigation of this subject, whether from a scientific or a practical point of view, are considerable. In the first place, many different chemical substances and combinations of substances have to be taken into account; secondly, the matter is complicated by the inability to ascertain with what dye a material has been treated; for, in the division of labour involved in the production, the material may have passed through several hands after it has left the dyer, who, moreover, often regards his method of procedure as a business secret. Notwithstanding these obstacles, I have arrived at a point where I can lay down certain principles, accompanied by the needful explanation; and I can do this the more easily because there is a remarkable analogy between these principles and those on which the Sanitary Woollen System is based. Although I have already stated the following fundamental truths, they cannot be too deeply inculcated, and I therefore recapitulate them.

If a strongly concentrated odour be inhaled, or a strongly concentrated fluid be swallowed, the smell or taste is repulsive; the rapidity of the voluntary movements, as measured by the chronoscope, is retarded; the limbs feel heavy, as if fatigued; the breathing is more difficult, particularly when an odour is inhaled; the flesh becomes soft; the body is distended; the heart beat more quickly and less regularly; the mood is depressed In other words, such concentrated matters induce feelings of weariness, weakness, langour, and depression; and if the

degree of concentration be intensified to a certain point, death will result.

Attenuated or diluted matters have a pleasant smell or taste, and are appropriately termed "fine." The rapidity of the voluntary movements when measured, as before stated, is enhanced; there is a sense of lightness and vigour in the limbs; the breathing is easy; the heart beats strongly but slowly; the mood is cheerful; in short, they have a cheerful, fresh, vigorous, and wholesome effect. Attenuated or diluted matters are therefore conducive to health and life, while concentrated matters engender illness and are poisonous.

On these fundamental facts are based the following principles respecting the sanitary importance of colours:— It is well known that dark are less healthy than light colours. Colouring matter in a concentrated condition is dark, and in an attenuated condition, light. When evaporation from colouring matter is inhaled, the odour from the dark colour is concentrated, and from the light colour is attenuated. The distinction is especially noticeable in summer, because, in the sun, dark colours absorb more heat, and therefore evaporate more freely than light colours. This explains why darkly dyed clothing is particularly disagreeable in summer, rendering the atmosphere hot, oppressive, and exhausting.

It is clear from the foregoing that the greater or less readiness with which a colouring matter evaporates constitutes an important difference. From this two deductions may be made.

1. Natural colours are preferable to artificial. Whenever natural colouring matter is present in hair or wool it is not situated on the surface; either the inner pith of the hair is coloured, or, when the outer stratum of the hair, which consists of numerous very minute spindle-shaped

cells, is coloured, the colouring matter is found in the centre of each cell, while the rind of the cell is colourless. This may be verified by examining through the microscope black horsehair resolved by sulphuric acid into separate cells. With dyed hair the colouring matter is at best equally distributed in the hair, and will clearly evaporate more easily than natural colouring matter, as it lies partly on the surface, while the latter is completely enclosed.

2. "Fast" dyes—*i.e.*, those which do not fade—are more wholesome than dyes which fade readily. The fading is generally, although not always, caused by evaporation. A dye which fades rapidly therefore gives off a concentrated vapour, and is thus injurious. A dye which fades or evaporates little, gives off an attenuated vapour, and is therefore wholesome. Whether a colour will fade quickly or slowly will partly depend upon the volatility of the colouring matter, as also on whether the latter simply rests upon the fibre or saturates it. The foregoing explains the important difference between indigo black and other black dyes; the former, as a much "faster" dye, is considerably less injurious than the rapidly fading logwood dyes. Among the lighter colouring matters, cochineal is notoriously the "fastest," and accordingly it is wholesome.

Of the foregoing propositions the leading one is sustained by the following circumstance. Colouring matters not only affect the health directly through their own nature, but also by their relation to the exhalations of the body. Such colouring matters as attract the "noxious" exhalations are inferior to those which attract the "salutary" exhalations.

The precise quantity of odorous matter which a solid body (in this case a colouring matter) attracts, depends, when other conditions are equal, on its own bulk; in other words, on the degree of its concentration: a concentrated

—*i.e.*, dark — colouring matter attracts more odorous matter (because it represents a greater bulk) than will the same colouring matter when attenuated—*i.e.*, in a lighter shade. Another firmly established fact is, that all matter, when concentrated to a certain point, becomes injurious, some reaching this point sooner, and some later. The difference between the "salutary" and "noxious" matters of the exhalations of the body is merely that the former require a higher, and the latter a lower, degree of concentration to become injurious. Hence it follows that whether a colouring matter attracts in preference the "salutary" or the "noxious" matters, it will be more wholesome in accordance with the smallness of the quantity of odour which it takes up; and this again depends upon its own degree of concentration—that is to say, upon its being employed to produce a light or a dark dye. Thus light colours are directly and indirectly more wholesome than dark colours.

I am certain that readers who have been in the habit of observing for themselves and of reflecting on this subject will be able to supply confirmation of what I have stated. For instance, black clothes are less comfortable than light-coloured clothes, and have a more disagreeable odour.

The effect on the nerves of various coloured clothing was strikingly confirmed by numerous nerve-measurements, which I made on several days in succession. I wore the same underclothing in each case.

In a brown suit the average interval of time, on ten occasions, required for the finger to stop the watch was $\frac{80}{1000}$ parts of a second; in an almost black indigo-dyed suit the average on eight occasions was $\frac{100}{1000}$; in a logwood-dyed black suit the average on twenty occasions was $\frac{144}{1000}$. Thus the indigo suit was 25 per cent., and the logwood

suit 80 per cent, worse than the brown, indigo being, however, 55 per cent. better than logwood. Further observations which I made as to the effect of colours on the powers of physical endurance, confirmed the foregoing. I tested my running powers in three different suits of clothing, and found that in the brown suit, which I tried ten times, the minimum distance was 800 metres, and the maximum 2,400 metres. On the three occasions on which I tested the indigo suit I could proceed no further than 800 metres, and in the logwood suit I was completely exhausted at 500 metres. These experiments were not repeated sufficiently often to allow of precise comparison; but they so completely harmonised with the results of the nerve-measurements that they will assist my readers to understand why I attach so much importance to the colour of the clothing.

XXXVIII.—SANITARY COLOURS OR DYES.—II.

TO properly understand this subject, it is necessary to bear in mind that each person has an individual constitution, and that consequently all people are not affected alike by one and the same substance or matter.

This may be illustrated by the well-known difference of taste which prevails respecting even those foods which would be expected to please and suit everybody, as, for instance, milk. Many thoroughly healthy people cannot endure milk; in nearly every large household will be found at least one person who not only dislikes milk, but whom it affects with stomach-ache and diarrhœa. Others, again, who are fond of cow's milk have an insuperable aversion to the milk of goats or asses.

This like or dislike for certain foods is apt to take an extreme form, that is to say, one class of people will be exceedingly fond of them, while the other will be equally averse to them; I refer to mutton, onions, garlic, cheese, cray-fish, strawberries, etc. The two latter delicacies have the reputation of producing, in certain constitutions, eruptions of the skin, inflammation of the throat, and similiar disorders. I myself suffer from inflammation of the throat if I eat strawberries; and this idiosyncrasy began with the setting in of puberty, and therefore with a so-called change in the constitution.

Returning to the question of colours, the diversity of taste in the choice of the colours of clothing is sufficient to show that not every colour affects all persons alike. Certainly, inasmuch as science ignores in what instinct and feeling really consist, the eye alone is assumed to be responsible for the diversity of taste in the matter of colours. This assumption, however, is shown to be incorrect by the actual discomfort, or, at least, diminution in comfort, which most people feel in black clothing; further, may be cited the cases which arise from time to time, especially since the introduction of aniline dyes, of severe poisoning effects produced by the dyes of articles of clothing.

That I am able to throw new light on the subject is partly due to my discovery in the "nerve measurement" of a method of testing the noxious or salutary quality of any given object, by accurately measuring the effect of the inhalation of its odour in retarding or acclerating the rapidity of the nervous action; but I have also derived information on the subject from experiences which have been gathered in connection with the Sanitary Woollen System.

When a white linen shirt is worn between the almost universally dyed outerclothing and the body, the action of

the dye on the health cannot be so powerful as when the underclothing is dyed, which is very commonly the case with woollen shirts and vests. Moreover, the Sanitary Woollen System causes the skin to develop much greater activity, and therefore to be much warmer than in the case of a wearer of linen; and it is the warmth of the skin which brings into action the dye of the woollen shirt.

The first insight into this subject which I obtained from personal observation was when I had occasion to wear mourning. Under my black clothes I wore a cochineal-dyed shirt. About this time an Italian physician had remarked to me that the Savoyards wear almost exclusively wool (as, indeed, is the common practice throughout Italy), but that they suffer much from ischias (pain in the hips). Not long afterwards I felt occasional drawing and burning pains in the neighbourhood of the hips and loins, and I was reminded of the foregoing remark, which I admit caused me considerable alarm. I found, however, as I went on, that at night I was free from the pain, which made itself most felt in a sitting posture, when the trousers were drawn tighter, causing a sensation of numbness or loss of feeling over the entire region, and of uncomfortable heat. A rapid walk on a warm spring day solved the problem over which I had for some time puzzled in vain. The exercise induced perspiration, and this was followed by a sensation as though I had a mustard plaster applied to the region of the hips and loins. It then first occurred to me that the black trousers might be the cause of the annoyance, which, indeed, rapidly subsided on my changing the trousers for a brown pair. In this case the "nerve measurement" of the cause of offence retarded the nervous action 75 per cent.

In another instance, a friend reported to me that a numbness or loss of feeling in the skin of the chest had caused him serious alarm, until he found that feeling was

restored on his ceasing to wear a grey woollen shirt, which, like my black trousers, had been dyed with logwood.

An interesting commentary on the effect of logwood was supplied to me by a hat manufacturer, to whom I related the foregoing incidents, and who remarked that the effect of logwood in depriving the skin of the sense of feeling was well-known in the trade. As a practical illustration he pressed the burning end of his cigar in the hollow of his hand, until the odour of scorching skin was perceptible, without any sign of pain.

As regards the effect of cochineal on certain constitutions, I have heard of several cases in which the wearers of shirts thus dyed have suffered from rheumatic and other pains, which have disappeared on the shirts ceasing to be worn. Cochineal dye may be compared, from a sanitary point of view, with cray-fish or strawberries; to some constitutions it is agreeable, while on others its effect is poisonous. The proverb says, "What is one man's meat is another man's poison."

If the dye is fixed so fast in the clothing that, even when the body is heated, only minute quantities mingle with the atmosphere of the clothes, and thence with the atmosphere which is breathed, the effect is, as a rule, favourable, provided that there be no special individual antipathy (or so-called idiosyncrasy) to the substance in question. If, however, the dye adheres loosely, or is "spurious"—*i.e.*, really fades; or if, when the dye is genuine and "fast," there is, in consequence of insufficient rinsing after the dyeing process, a surplus of loose colouring matter (perceptible by its rubbing off), the deleterious, poisoning effect will be apparent.

A further consideration is, that the evaporation of dye from the clothes is largely dependent on the temperature

and humidity of the atmosphere, being less under conditions of cold or dryness, and greater under those of warmth and moisture. Thus the effect of a thick garment in winter, or in dry weather, or where the body is in repose and the skin is cool, may be neutral, or even agreeable; while in summer, in hot rooms, or when the body is heated, deleterious effects (irritation, languor, local pains, etc.) may be felt, especially when to these conditions are added a damp atmosphere and perspiration.

The principles of our system of selecting materials are the necessary deductions from the foregoing considerations, and I will here shortly recapitulate them:—

1. For summer clothing, work-a-day and every-day costume, especially for any kind of athletic sports, as also in bed clothes, the material should be entirely free from dye—i.e., natural white or natural brown.

2. Dyed materials are least injurious in winter, in cold climates, when the body is in repose, and for Sunday, visiting, and holiday attire (but not for dancing exercises, which is a species of athletic sport).

3. Wholly to be condemned are all dyes which contain lead. The assertion that sulphur dyes are only injurious when they contain arsenic is quite false; they are always noxious because of their volatility.

4. "Fast"—i.e. non-volatile—dyes are admissible, but only when no residue or surplus of loose, unfixed dye is left in the garment: this is easily tested, as in such case the colour comes off. As the process of fixing can only be complete when the wool is dyed before being worked up, all fabrics which have been dyed in the piece, or printed with dyes, should be rejected.

5. The less colouring matter that a garment contains—i.e., the lighter it is dyed—the smaller will be the danger arising from the colouring matter.

In carrying out a system of sanitarily coloured clothing, it would be impracticable to discard all artificial dyes, and I have therefore adopted certain dyes, especially indigo and cochineal. Indigo, cochineal, and logwood are each capable of engendering the phenomena of poisoning; but in practice there is this difference, that indigo and cochineal, as "fast" dyes, never evaporate from the clothing in such quantity as (idiosyncrasy excepted) to produce injurious effects. The converse, however, holds good of the "spurious" logwood dye, which, moreover, has the faculty of attracting the "noxious" exhalations of the body.

I will here quote from a communication which was made to me in August, 1886, by a correspondent :—

"I believe that you are yourself of opinion that the experience thus far attained is not conclusive. It is highly improbable that cochineal, indigo, and madder are the only sanitary dyes with which animal fibre can be treated; there must be others, as well as many which are capable of being transformed from their present harmful or indifferent nature to a wholesome quality, if made sufficiently well; for instance, even the injurious exhalation of aniline dyes may be much moderated. Permit me to express a doubt whether cochineal, madder and indigo are always used wholly pure; indigo cannot be used alone without some admixture of logwood, and the other sanitary dyes are often blended, in order to procure certain shades of colour. You are aware that imitations of indigo can be made which are so "fast" that they withstand the test of sulphuric acid."

In reply, I pointed out to my correspondent that investigations as to the sanitary qualities of dyes can only be made by persons who are technically connected with dyes, and who must be practical, not theoretical men. Such men will not institute researches which would cost much time and money unless induced or compelled thereto for business purposes; and this inducement or compulsion can only be created by a categorical demand for sanitary dyes from a sufficiently large number of consumers. The

question of dye concerns only the Sanitary Woollen Outer-clothing, the Sanitary Woollen Under-clothing and bedding being of natural colour; and the number of those who recognise the hygienic importance of sanitary dye is not yet large enough to affect the general tendency of manufacturers to use cheap, unsanitary dyes. Moreover the ladies have hitherto shown little interest in the question, and it is they who must give their support before a large range of sanitary dyes can be forthcoming. To show the importance of the subject to ladies who wear coloured stockings, I may refer to a paragraph which recently appeared in the papers, giving a detailed account (including the name) of a young lady who recently made her feet sore by dancing a whole evening, notwithstanding that her shoes gave her great pain. Within a few hours her blood was found to have been poisoned by the poisonous dye of her stockings having entered the wounds in her feet, and the account states that in order to save her life both feet had to be amputated.

In another case which was lately reported, a woman while knitting with green wool, noticed a small blister on the thumb of the left hand, which she pricked with a knitting needle, and pursued her work. Through the open blister the arsenic in the dye must have penetrated the hand and thence the arm, as very soon serious symptoms of blood poisoning set in, and caused her death.

Men who consider the question at all are satisfied if they can procure dark materials sanitarily dyed; and if a comparison be made between the sanitarily dyed materials which can now be obtained of the authorised manufacturers and those which they at first supplied, it must be admitted that progress has been made, both in the materials of outer-clothing and in the hats. Two years ago no black hat was made which was technically and hygienically irreproachable: only after lengthy and laborious attempts have we succeeded in solving the problem.

XXXIX.—TECHNICAL DIFFICULTIES.

WITH the continual development of the demand for Sanitary Woollen Clothing and Bedding the difficulties to be surmounted increased rather than diminished especially as regards the Outerclothing.

Quite at the beginning, when I had only arrived at the conviction that the clothing material must be free from vegetable fibre, it was a comparatively simple matter to examine microscopically a selection of patterns and to separate the pure ones from the adulterated, leaving a fairly large choice in point of thickness, web, dye, dressing, &c. Here already we met with a difficulty—the pure materials were always highest, and the adulterated lowest, in price. Then came the conviction that the thick felted cloths and stuffs ordinarily used for Outerclothing should be superseded by porous stockinet cloth. This again increased the price, as stockinet cloth is relatively much more expensive than cloth of rectangular web, for the following reasons :—

1. In pure wool, the difference between natural wool and shoddy is that the fibre of the first is long, of full vigour, and expensive, while that of the second is short, deadened, and therefore little durable, but it is low in price. The mingling of the less costly but inferior shoddy with the natural wool is much more easy in the case of cloth with rectangular web than in weaving stockinet on the round loom, when the woollen threads require to possess greater tenacity.

2. In weaving stockinet cloth, whole pieces are liable to be more or less spoiled by irregular working of the complicated machine, and losses thus incurred must of course be recouped by the manufacturer in the price of the

unspoiled pieces. The greater costliness, again, diminishes the demand, and consequently there is less inducement to make stockinets.

A whole series of fresh obstacles arose when I discovered the hygienic importance of dyes. In the first place shoddy, which of course is always dyed, had to make way entirely for the more expensive natural wool. Secondly, as natural white wool can only be used to a limited extent for Outerclothing, recourse was necessitated to the wool of black sheep, and here came the following difficulties :—Sheep which yield black wool are few in number and widely scattered, so that the wool can only be procured in small parcels. Black wool drawn from different districts not only varies greatly in fineness, crispness, &c., but also in colour. To obtain anything like uniformity it was absolutely necessary to mix the wools together, and to add white wool. This gives rise to defects of colour (here and there too light or too dark threads) in the finished fabric, which diminish the value of the material, or even render it unsaleable.

When therefore I requested my authorised manufacturers to produce natural brown (*i.e.*. undyed) materials, I encountered the greatest opposition. The manufacturers of the shirts declared the idea an impossible one, and for a long time no one was inclined to risk the manufacture of such materials for Outerclothing. It was thus no small matter (in 1883) for my manufacturers to have accomplished, when they were in a position to supply 1. Natural brown shirts of the finest quality of wool; 2. All bedding materials in natural white and natural brown; 3. Knitted natural brown Outerclothing for children and adults, and natural brown socks and stockings. The manufacture of natural brown stockinet material for outer-clothing presented the greatest difficulties of all, but even these were subsequently triumphantly overcome.

As explained in the chapter headed "Trousers or Breeches—1," the endeavour to work in cheap shoddy led to the manufacture of the heavy cloths which I have termed "elephant hides," and which, owing to their thickness, and consequent imperviousness, are unsanitary. These heavy materials have the appearance and reputation of solidity, but are of course just the reverse, being trashy through and through. If comparatively light materials like stockinets were made with such rubbish, they would tear as readily as spiders' webs; but the tailors and the public are accustomed to this rotten "solidity," and when the first genuine, natural brown, light stockinet cloths were produced, and the prices quoted, everybody said "this will never sell."

The position is now somewhat changed, and people begin to understand that in this matter also I hit on the right direction. But from the birth of this recognition, to the day when the manufactured Sanitary Woollen Outerclothing materials could be supplied in sufficient quantity, was a path strewn with thorns. It must be borne in mind that my System in the matter of dyes aroused the hostility of yet another branch of industry—the dyeing trade—who neglected no opportunity of combating it.

The question of price is of course continually raised, and I answer it thus:—In no province of industry has the principle of "cheap and nasty" been more unscrupulously and unconscientiously applied than in that of the manufacture of Outerclothing, not only by the employment of shoddy, but even by shamelessly weighting the woollen materials with mineral matter. I consider it one of my chief duties to my authorised manufacturers to assist them in establishing the converse principle, that the best, not the worst is cheapest in the end. For even though good materials be expensive, the expense is abundantly recouped by greater

durability, and above all because the "first wealth" of health is thereby promoted.

In the days when cloth was made of solid, pure wool, dyed only with indigo, the peasant farmer paid a good round sum for his coat, but he acquired a property which he could bequeath to his children. Contrast with this the dust which is every morning collected in the rooms in which the modern woollen materials of clothing, carpets, and furniture are used! So large a proportion of this dust is shoddy that it is easy to calculate how soon the entire shoddy splendour will give out, and have to be thrown on the dust heap. Whether the day will come when the authorities will proceed as energetically against adulteration of clothing as of food, is a matter which I commend to the public consideration. I consider it my duty to watch that my authorised manufacturers maintain the highest standard of quality, and I beg my adherents, in their own interest—1. Not to be misled by apparent cheapness, but to satisfy themselves that the goods are unadulterated, and do not readily shrink. 2. If they desire my guarantee on these points, to insist before purchasing on seeing that the goods bear the genuine trade-mark. The success of my Sanitary Woollen System has led unscrupulous persons to endeavour to counterfeit some of the Sanitary Woollen articles, and the shops swarm with imitation shirts, etc., in some cases containing a considerable admixture of cotton, to say nothing of the treatment in respect of dye.

These counterfeits of the Sanitary Woollen Clothing, rugs, &c., are frequently palmed off upon the public by the following trick: the vendor procures a few specimens of the genuine goods, bearing the authorised trade-mark, and exposes them in his window, while inside the shop imitation goods are either sold as being genuine, or the purchaser is assured that the counterfeits are just as good or better.

It would be well if, in all such cases, the public would communicate the facts to the head depôt, when the articles required can be supplied, and such steps as are practicable can be taken to prevent a continuance of these deceptive and dishonest practices on the part of the retailer.

The sole guarantee of genuineness is the authorised trade-mark, with which the public may easily make itself acquainted through the descriptive catalogue issued of the Sanitary Woollen Clothing and Bedding; and as it is one of the most pleasing features of my Reform that those who interest themselves in it and adopt it from conviction share my anxiety to see its general extension, and render me invaluable service by recommending it and explaining it to others, I feel confident that my appeal to them to assist me in guarding the public against the imposition of counterfeit clothing of dubious quality will not be disregarded.

XL.—THE RANGE OF THE SANITARY WOOLLEN SYSTEM.

ALTHOUGH I neglect no opportunity to combat the notion that the Sanitary Woollen System must afford to all who adopt it entire immunity from disturbances to health, I will here briefly consider what the experience so far (December 1885) gathered has shown that the System cannot perform. But, first, I must make a few prefatory remarks.

Everyone is born with a nature wholly peculiar to himself, which finds expression, not only in all that he does or omits to do, in his outward appearance, features, handwriting, gait, voice, &c., &c., but also in the conditions which

relate to his health. These conditions are (a) *quantitative*, *i.e.*, they refer to the general strength of constitution; there are strong and delicate natures in every possible degree. (b) *qualitative;* the fact, that the human body is composed of a considerable number of various organs, tissues, and systems gives rise to great diversity among different people. The rarest case is when the constitution of all the organs, tissues, and systems of a body is equally good or bad; on the one hand there is usually a so-called "weak side," a "sore point," a point of least resistance, on which it is rightly said that every disturbance to the health either exclusively or in the main fastens; on the other hand, most people have a "strong point." For instance, one person's sore point will be his stomach, another's the lungs, a third's the mucus membrane of the nose, a fourth's the nervous system, a fifth's the intestines, and so on, *ad infinitum*. Hardly any one but will have some "sore point" in his organisation, and of course the converse holds good, *i.e.*, nearly every one has an organ or system of which he has never to complain, and with which nothing is ever wrong.

Now, when a person adopts the Sanitary Woollen System, there may be considerable change in his state of health, but his *inborn original nature* undergoes no radical change. A nature originally delicate will be more healthy than before, its powers of endurance will be greater, many troubles will altogether disappear, but it will always remain delicate; *i.e.*, if two persons, one born delicate and the other strong, adopt the Sanitary Woollen System at the same time, both will be better and healthier for it, but the gulf between them continues as a rule to be as wide as ever. The difference can only be overcome when the previous disparity was not *innate*, but was due to the very enervated condition of the one, while the other was

already tolerably hardened. The *innate* difference is never overcome, and, for instance, the nature of women will always remain more delicate than that of men. Here I may point out that, naturally enough, many of those who adopt the Sanitary Woollen System are delicate, and are either actually ill, or with strong tendency to illness; while people endowed with hardy, tough constitutions, are less drawn to it, unmindful that "prevention is better than cure," and sceptical as to the greater vigour and comfort which it would procure for them. Consequently the System is often enough subjected to unfair criticism; and because it cannot perform the impossible, is visited with the blame which is due to the delicacy of the inborn constitution.

What was previously a "sore point" remains so nearly always, even after the adoption of the Sanitary Woollen System. For instance, a disordered stomach can be cured by the System, but the stomach will usually remain a "sore point," *i.e.*, every disease-cause which can still take effect will tend to make itself felt in the first place in the stomach.

So much as regards general *tendency*, and we will now consider the diseases to which Wool-wearers are subject, and whence they arise. The question of origin must be divided into old causes and new.

1. *Old Causes.*—To these are due the Woollen System crises, sufficiently treated of in other chapters. They are cleansing processes by which the body ejects the stored-up disease-matters in the form of mal-odorous, usually very plainly perceptible, secretions; and while they last the person concerned feels more or less unwell. They either appear immediately after adopting the System, or later on, and cases have been observed in which they have been delayed for years. The old disease-matters do not always, however, take their departure in the shape of a crisis,

i.e., with pronounced symptoms of disease, but sometimes disappear quite gradually in the form which the earlier medical school termed "Lysis." It should be explained that when several "old causes" require to be expelled, this is usually accomplished in an equal number of stages, and that the older the cause the longer is the crisis delayed. It follows that *innate tendencies to disease* are the most stubborn, and of this my own case is an example, as my innate tendency, inherited from my mother, to affection of the tonsils, which again my children have inherited from me, has not yet disappeared. I anticipate that my children will ultimately lose it, indeed, the eldest but one has already done so; but whether at my age I shall shake it off altogether is doubtful, although I cherish the hope.

2. *New Causes.*—Of these I specify two classes :—

(*a.*) Neglect of the principles of the Sanitary Woollen System (woollen clothing, woollen bed, sanitary dyes, open window, *i.e.*, pure air) may induce symptoms of the nature of a crisis, but of very much milder character than those which proceed from old causes. I have observed such incidents with my own children who still attend school, and who have occasionally suffered from what is called school-feverishness, lasting half a day or a day, during which time the odour of the offensive school-room atmosphere has been plainly perceptible in their exhalation.

(*b.*) Excessive mental emotion or excitement is a not infrequent cause of illness in Wool-wearers. That mental agitation can of itself make people ill, and destroy the power of resistance to disease-causes, may be read in most medical works. Anger, fear, grief, care, home sickness, thwarted love, are popularly known as disturbances to health. But, it will be said, the Sanitary Woollen System is supposed to protect against such evil effects: to which I answer, that this protection is no more to be conceived

as absolute than is the idea of bodily strength. The strongest athlete can be overpowered by an ox or a lion, and similarly the greatest strength of mind may be subjected to an influence with which it is unable to cope. Wool-wearers experience an enhanced capacity of resistance to the effects of the emotions, but a sudden great misfortune, or reverse following on reverse, may be too much even for them, especially if they be originally of a delicate constitution. It is the same with work. The Wool-wearer can perform a greater amount of physical or of mental labour than was possible before he adopted the System, but it does not follow that he has become a *perpetuum mobile*. If he labour too long or too intensely, he will suffer like anybody else from the effects of over-exertion. Even then he has the advantage over an unsanitarily clothed person that, in consequence of the active condition of his skin, he sooner rids himself of the "noxious" matters; *i.e.*, other things being equal, his vexation or wrath evaporates sooner, his excessive fatigue passes more quickly; but until the emotion has evaporated his power of resistance to disease-causes will be affected.

Wool-wearers are, of course, liable to be affected by all poisons. No human being is proof against poison. Whoever inhabits a room where the wall paper contains arsenic; or whose occupation exposes him to the action of phosphoric or metallic poisoning; or to having much to do with materials of linen, cotton, paper, &c.; or to continual stench of decaying or putrifying matter, is liable to suffer in his health, even though he be clothed in wool. It remains his duty to take every possible precaution against influences which are obviously injurious, when he cannot altogether avoid them. And lastly in cities, especially where the drainage, &c., is defective, Wool-wearers will never be so so healthy as when they can breathe the air of the moun-

tain or the forest. But be the conditions what they may, the Wool-wearer will never suffer as badly as people who are unsanitarily clothed, and his finer sense of smell will always enable him, if he has taken to heart the teaching of my Sanitary Woollen System, to make the best of an unfavourable situation.

PART IV.—VARIOUS.

XLI.—BATHING AND TREATMENT OF THE SKIN.—1.

FROM time to time I have encountered persons who declared that the Sanitary Woollen Clothing did them no good, but made them languid and nervous. At first I attributed this to the early stage of their experience, but when similar complaints were made in cases where the System had been adopted for twelve months, it became clear that there must be some other cause. I am indebted for the discovery of this cause to my attention being drawn to the fact that similar symptoms are constantly found in cases of excessive use of shower and other cold baths. On inquiry, I ascertained that all those who had made the above-mentioned complaints regularly took such baths. Before I advocated the Sanitary Woollen System I had spoken against the too frequent use of so strong a stimulant, and this especially applies when Sanitary Woollen Clothing is worn. The latter attracts the blood to the skin, which is good, and cold baths do the same thing for a short time; but the combined effect is bad, just as two good meals, taken together, would be unwholesome. For wearers of ordinary clothing cold baths are beneficial, when not used in excess and too regularly, because the linen or cotton shirt has the bad effect of driving the blood away from the skin. To such persons the cold bath affords an increased circulation of blood at the surface, at

least for a time. But *dry* woollen clothing, after a cold bath, causes such a flow of blood to the surface that the supply to the brain and the intestines is impoverished. We here again see that nature's laws must be respected. The wearer of Sanitary Woollen Clothing must take pattern by the woollen-coated animal, which does not throw off its clothing, go into cold water, dry itself, and then resume its dry clothing, but goes, coat and all, into the water. The cooling effect of the evaporation set up through the drying of the wet coat on the body counteracts the excessive tendency to expansion of the surface blood-vessels; and it is precisely to this evaporation that is due the lasting refreshing effect of the bath. Let the wearer of Sanitary Woollen Clothing follow this example, and, if he wants to be refreshed, wet his fleece. The body should either be anointed with an unguent (as to which see next chapter), or it should not be dried; and in warm dry weather the shirt should be dipped in the water, or sponged over, and then the dry overclothing put on. The effect is most pleasant, affording an enjoyment from which the wearer of linen or cotton is debarred, and preventing the languid feeling often experienced after bathing. But here again moderation is a golden rule; as already explained, Wool-wearers do not require the cold bath for its stimulating effect; while, as the secretions pass freely away in vapour, instead of being turned to water on the skin, the latter remains clean and wholesome. Wool-wearers should therefore study their feelings in the matter, and be guided by them. Summer bathing in the open should be on the same plan. The shirt should be kept on, or wetted before it is resumed; the best bathing costume is a combination-garment of short-sleeved shirt and short drawers, fitting closely, and made for the purpose. The bather simply keeps this on, and, after pressing out the surplus water, draws on his Outerclothing.

This wetting of the Underclothing will be found a capital substitute for the refreshment of a bath when such cannot be had.

To allay uneasiness, I may remark that experience has long shown that pure woollen clothing, when wet, may, without any injury to the body, be allowed to dry on it. A constant proof of this is afforded by the woollen-clothed fisher population on the shores of the Baltic, who are noted for their splendid health.

In PIERER'S ENCYCLOPÆDIA, of 1835, the article on "Baths" concludes with the words, "the use of public Baths declined and gradually ceased as the linen shirt came to be more generally adopted in place of the woollen garment previously worn, and in respect of bodily cleanliness stress was laid on washing the shirt and not the body itself."

I consider this observation a very just one. The more I investigate and reflect on the question of bathing and washing, the clearer I see that the Wool-wearer feels, precisely in the same way as the wool-wearing animal, the desire from time to time, especially in the warm season, to bathe, *i.e.*, to wash the whole body, which, when it is clothed in wool, is very sensitive to dirt. On the other hand, the skin of the Linen-wearer becomes insensible to dirt, and thus he loses in great measure the desire for bathing. For it is a fact that the mass of the people bathe far less at the present day than in earlier times, when every village had its baths. Bathing is now, except perhaps in the case of dwellers by the sea, a luxury indulged in only by the better-off classes. Thus the assertion that people clothed in Wool are shy of using water is directly opposed to historical truth. With the old Wool-wearing nations—Greeks, Romans, Jews—the system of bathing was far more developed, and far more common, than it is at the present day under the reign of linen and cotton.

I have dealt in another chapter (page 74, Hydropathic Treatment) with the question of the remedial effects of bathing.

XLII.—BATHING AND TREATMENT OF THE SKIN.—2.

ANOTHER proved means whereby Wool-wearers can secure themselves against any injurious effect of Bathing, and derive only benefit therefrom, is by anointing the skin with Bath-Oil, and this method has the great superiority over that described above—of putting on the shirt while the body is damp—that the former is practicable at all seasons of the year.

Anointment with Bath-Oil should be practised after every bath (except when the shirt is rendered damp). Also after Steam or Turkish Baths, (see page 121) or after Foot Baths (see page 123) the body or feet respectively should be anointed. What I have stated above as to Bathing in general holds good with Turkish Baths, &c. It is quite unnecessary for Wool-wearers to be constantly bathing the skin.

Let us endeavour to learn from the ancient Wool-wearing nations — the Jews, Greeks, and Romans — how Wool-wearers should care for the skin. The bath was not taken with exaggerated frequency; fragrant herbs were mingled with the water; the Bath was followed by anointment with fragrant oil or salve. The modern Wool-wearer should do the same. The anointment of the body with Bath-Oil has already been touched upon; but aromatic extracts of herbs should be added to the water used for washing, the best being the REGLIN Essences. Such lavations are not

merely a hygienically irreproachable treatment of the skin in health, but are also a *curative remedy* for sick persons, and I will therefore refer to them, so far as space will allow, more in detail. The recipes have been furnished by Frau ELISE REGLIN (see page 73).

Direction 1. For lavations of the ENTIRE BODY, white essence should be added in the proportion of two table-spoonfuls to half-a-pint of water, and, beginning with the legs, the body should be laved, one part at a time, and quickly dried, to be afterwards rubbed with Bath-Oil.

Direction 2. In cases of FEVER the entire body should be laved, as in Direction 1, with very cool (not cold) water, and white essence, and afterwards anointed with Bath-Oil. The back, chest, and abdomen should then be rubbed with the undiluted white essence, and, if it is desired to double the effect, a poultice as described in Direction 3 should be applied.

Here I must refer to the REGLIN Poultices, already mentioned, on page 73, where the reason is explained why such poultices (see Direction 3) promptly affect the distribution of the blood, and thereby the internal temperature of the body.

Direction 3. POULTICES—A strip of natural coloured woollen material, about two hands broad, reaching from the throat almost to the lower end of the trunk, is dipped in essence. For more torpid constitutions, and where the condition is weak, brown essence should be used, and for more sensitive constitutions, and in conditions of fever or inflammation, white essence. The woollen strip must be well pressed out, and then laid over chest and abdomen. If it is desired to modify the effect, the strip may first be dipped in water, and then, when wrung out, in essence.

Over this is laid a dry, somewhat broader, woollen strip, and both strips are, if necessary, kept in position by safety-

pins or tapes. If the poultice remain too long damp and cold it is a sign that the patient cannot bear it, and it must be removed. In such a case benefit may be derived by varying the character or the strength of the essence, which may, moreover, be rubbed on the skin, in order to accustom the body to eventually bear the poultice.

Another form of poultice is required when the complaint is not, like fever, general to the whole body, in which case the poultice just described is not applicable; or when, in addition to the general condition of the disease, some one point is especially threatened. In the latter case there should be applied, besides the above-named poultice, the following:—

Direction 4. LOCAL POULTICES.—For material, and method of moistening, see Direction 3. These poultices have proved a potent remedy for local conditions of weakness, as well as for inflammatory complaints; the poultices must, however, not only be applied to the part affected, but must cover the whole surrounding region. Anointment with Bath-Oil should *precede* the application.

Cases may, of course, arise in which the poultices here described do not of themselves suffice. If, for instance, the patient shows considerable weakness, or if the temperature in fever be high, the remedy of "packing" should be applied as follows: The patient is undressed, laved with water and white essence (see above, Direction 1), the body not being yet anointed, and is then packed in a damp woollen cloth*—a blanket is the best—which has previously been simply

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* In case I should be accused of riding a hobby, I may explain that it is by no means of trivial importance to ensure, by using damp *woollen* material, that the blood shall not be repelled from the skin, as necessarily happens when damp linen or cotton material is used.

dipped in water and wrung out. Only when the patient's condition is one of considerable weakness may this cloth be also damped with White Essence, otherwise the stimulating effect is too great. A dry woollen coverlet is then wrapped round the damp cloth or blanket, and over this again should be a further woollen covering, whose object should especially be to keep the feet warm. In packing the patient in the damp cloth and woollen coverlet, particular care should be taken that both are well closed at the throat, in order that no cold air may penetrate between the packing and the body; and that the patient may not re-inhale the diseased exhalation which it is endeavoured to expel, and thus either render the whole treatment illusory, or greatly diminish its effect. The patient's head should also be wrapped in a damp woollen cloth, with a dry one over it, leaving the face free. The patient remains thus packed for three-quarters of an hour, when he is released, and the damp cloth, which has meanwhile become very warm, and in some instances more or less mal-odorous, is immediately removed from the room. The body is then washed and anointed (according to Direction 1), and a poultice (Direction 3) is applied. If necessary, a further poultice (Direction 4) is applied to the head, should the heat in that region not have abated, and the patient is left to repose.

I will end this chapter with a homely but valuable recipe for daily washing.

The face should be wetted first and dried last, *i.e.*, after the other parts are washed and dried, and, while drying, the arms should be several times manipulated from the elbow towards the hand. Whoever observes this rule will never, or very rarely, be troubled with toothache or with the congestion of blood which induces headache.

The bathing and treatment of the FEET is dealt with on page 123.

XLIII.—THE AIR IN ROOMS.

THE injurious effect of the air confined in rooms is one of the oldest and best known themes of sanitary science. Writers on health abound with advice as to ventilation, the keeping as much as possible in the fresh air, and so on, and my readers know the importance of sleeping at night with the window open. Therefore, in making the following suggestions with reference to the air in rooms, I am only pursuing and extending the ancient track. I have now (autumn, 1881) had three years' experience of the Sanitary Woollen System, and I can safely say that it has answered the expectations formed of it. It is a powerful remedy, and, when the body is hardened, maintains those who adopt it in as sound health as, for instance, the horse, or the house dog. More than this cannot be demanded of any system by those who dwell under artificial conditions, within four walls. But the improvement implied by the above comparison will be patent to every one who knows how much less often the dog is ill than its owner.

To laymen at the beginning, the Sanitary Woollen System may have seemed as if it would accomplish even more than this, but medical men know that all systems of cure and rules of health, such as the use of special baths, change of air, change of diet, etc., work much more energetically at the commencement than when the body becomes accustomed to the altered conditions. The reason is that the bodily machine at once seeks to restore the equilibrium thus disturbed, and to this end works more rapidly, causing freer and more complete exhalation of the

"noxious" vapours. The consequent improvement in health at the commencement should not be allowed to mislead, as the value of a rule of health can be first estimated when the body is accustomed to it.

This stage in the Sanitary Woollen System has now been reached by many, and the conclusion arrived at is, that the System procures the addition of health for which man has hitherto had every reason to envy the domestic animals; but the Wool-wearer shares with the domestic animals those diseases which are the *raison d'être* of veterinary surgeons. The question now to be asked is, Cannot matters be carried any further? Again the animals supply the answer, and most plainly.

I describe the Wool-wearer as being as healthy as a horse or a dog, or more precisely, as housed cattle; a higher degree of health is attained by grazing cattle—for example, by sheep. These are much less subject to diseases due to the personal "noxious" exhalations—for instance, Wool-wearers do occasionally catch cold in the same way and for the same reason as housed cattle, while grazing cattle are absolutely weather-proof; but the latter are not proof against infectious diseases, although the fact that sheep are more so than oxen was impressed upon the soldiers in the Franco-German war, who had for that reason to subsist on mutton. That the sheep is infected with very dangerous parasites does not affect the argument, for all wild animals have parasites.

To what is the higher degree of health of grazing cattle due? Simply to the cause that makes our soldiers healthier during the month of the manœuvres than when they are penned in barracks. Grazing cattle constantly bivouac, at least in summer, and are not poisoned by the air of their stable. Yet a degree higher in health than grazing cattle are ground game (hares, foxes, deer, partridges, pheasants, etc.), which

also bivouac in the winter. These animals are not only weather-proof, but epidemics are much rarer with them than with grazing cattle; still, however, such diseases do occur, and it is very interesting to inquire the reasons, which are explained by the following two facts:—

1. Animals which live *on* the ground are more proof against epidemics than animals which live *under* the ground: for instance, field mice are subject to violent epidemics, which will destroy nearly the whole of them in a district; and this occurs when the mice are so numerous that the whole ground smells of their excrement, and is therefore saturated with poison proceeding from the mice themselves.

2. The birds in the air are absolutely infection-proof. I have never heard of nor seen an epidemic among crows, jackdaws, sparrows, starlings, swallows. The only diseases to which they are subject are from lice and worms; and they sometimes suffer from predatory animals, frost, hail, etc. Their "self-poison" is mainly contained in their excrement, and with this they hardly ever come in contact, while they are removed from every kind of miasma of the ground.

Now comes the question to what degree of health man may hope to attain, having regard to existing circumstances and customs, and without heavy expenditure; in other words without building castles in the air, or seeking to inhabit balloons, as he would require to do to become as healthy as the birds. This condition is, therefore, unattainable; and here, as everywhere, to demand perfection generally leads to realizing little or nothing. Those who have followed my suggestions as to Sanitary Woollen Clothing and Bedding and sleeping with open window have reached a degree of health equal to that of the horse; the next degree, and the only one practicable for discussion, would be health equal to that of sheep.

The experiences of this winter (1881-2) give me the firm

assurance that this is tolerably easy to attain, for it is merely a question of the atmosphere in living and working rooms, respecting which I am in a position to say something more radically helpful than my predecessors on the subject of ventilation.

Before coming to the practical side of the question, I must again institute a comparison with the domestic animals. If they be classified according to the facility with which they contract disease, the lowest place must be assigned to stalled cattle, the horse and the ox, who live in the same space in which they deposit their excrement. Why does the dog possess more power of resistance to disease? Because the dog is cleanly indoors, and does not, like stalled cattle, subject itself to the injurious influence of the odour of its excrement; while chained dogs, who cannot get away for the purpose, are not confined in close rooms. The greatest strength of resistance, and the toughest nature of all, has the cat, which carefully buries its excrement, and is not confined to the atmosphere of rooms, or chained to miasmatic ground, as dogs frequently are, but seeks the airy and lofty parts of dwellings. These considerations show that the worst enemy to the health of every being is found in the mal-odorous portion of its own exhalations. This is most readily apparent with respect to sewage, and the attention of sanitary authorities has been rightly devoted, in the first place, to the removal of this notorious "self-poison." I may, however, point out that the plan of the cat, which buries its excrement *immediately*, is better than that of allowing it to ferment and distil, so as to give out a maximum of odour.

That the atmosphere in rooms which are inhabited, even when no air from drains, etc., forces its way in, soon becomes loaded with "self-poison," has, of course, long been recognised; but much too little attention has been

paid to the fact that these exhalations are not only dispersed in the surrounding air, but are also caught up and retained by the objects in a room, to be again, on occasion, given out. So long as a dwelling-room is abundantly ventilated there is no danger, and followers of the Sanitary Woollen System are in this respect much better off than those who are mis-clothed; for they can not only sleep with open window, but also, as they are not afraid of draught, and have less need of external warmth, can work with open windows and doors. I may here remark that while the air in a room remains, through ventilation, free from poison, its temperature may, without becoming too cold, sink much lower than when, in the absence of ventilation, it contains poisonous matter; "self-poison," in fact, chills, and I know Wool-wearers who work in winter by open window, which is the right thing to do.

The difficulty begins when the cold necessitates warming the rooms; proper ventilation then becomes expensive, for the warmth escapes simultaneously with the vitiated air, so that most people resign themselves to the inevitable, keep their windows shut, and live in a stuffy atmosphere.

I believe that the danger thus incurred would be greatly lessened if all those objects were removed from the room which absorb the noxious exhalations. If they would retain them, their presence would be a benefit, but warmth and damp cause them to give these exhalations out again, and they are and remain mal-odorous. After a close examination of the subject I am in a position to denounce the unwholesomeness of the dust in rooms. It is only necessary to inhale the odour under a piece of furniture, whence the dust is not regularly removed, to be convinced of this; or to compare the very different smell of the atmosphere of a room before and after the latter has been thoroughly cleaned and dusted out. Further consideration

of what constitutes the dust in rooms shows that this offensive smell is less that of the dust particles *per se*, and has in a much greater degree been taken up by them.

The following are mainly the constituents of the dust in the rooms:—(*a*) Earth dust: We know that the earth readily absorbs odours, and gives them forth again under the influence of warmth and damp, hence the dangerous ground miasmas. (*b*) Coal dust: Coal has such strong absorbing power that it has long been used for deodorization; it seems to retain odours more firmly than earth dust, but still coal dust cannot be considered harmless. (*c*) Vegetable fibre dust: This proceeds from the linen and cotton materials of clothes, etc., and from the droppings of horses, etc., in the streets, also from the wear and tear of floors and wooden objects. It is clear that vegetable fibre dust must act in a similar manner to vegetable fibre in clothing.

Dust thus constituted cannot but be most dangerous company in a room, as, if allowed to remain, it becomes poisonous, and, when it is disturbed and enters the lungs, has not only an irritating effect, but, becoming moist, gives out its noxious odours within the body. The disagreeable odour when a dusty floor is wetted is well known, and a damp atmosphere suffices to let loose the smell. Hence follows the recommendation not only to remove the dust of rooms as often and as thoroughly as possible, but also to adopt certain methods of doing it. In dealing with the dust in rooms most ladies and their servants make three mistakes.

The first is that the dust is more driven about the room than actually removed. If a room of which the windows are closed is swept out, and the furniture wiped down, it looks comparatively clean, but is nothing of the sort, because a large portion of the dust has deposited itself on the walls, and on projections, such as picture-frames,

mirrors, etc., between the books on the shelves, and behind the heavier furniture standing against the wall. Nor are things much improved by the opening of one or more windows on the same side of the room. What is wanted is a thorough draught of wind; and if a room has only windows on one side, a window in the passage or elsewhere should be opened to cause such a draught as will really carry the dust out of the room. Windy weather is of course best for this purpose, to which I attach so much importance, that I would recommend the sweeping out of rooms to be deferred when, in the absence of wind, it is impracticable to create a good draught.

An important help in getting rid of the dust by means of the wind is to attach a large piece of paste-board to a wooden handle, and, after the room has been swept, to stir the air, driving the minute dust out of the corners and angles, away from the walls, preventing it from settling anywhere, until the room *smells* free from dust. No sense can be so relied on for accuracy in this respect as that of smell: long after no more dust can be seen the nose will detect it.

A second mistake is the belief that through moisture (tea-leaves on carpets, or a damp cloth on wooden floors) the dust is prevented from rising, and is removed. Some, of course, is removed, but only such as is on the floor, and that not entirely. The fine dust, clinging to the walls and ceiling, can only be dealt with by stirring the air, as just described. And it is this fine dust which is most dangerous, for it consists of the specifically light organic matters, while the heavier mineral dust sinks on the floor. The third mistake is the habit of overlooking the dust which is more difficult to get at, behind furniture, pictures, mirrors, and so on. It is only necessary to smell at these places to be convinced how they must assist to vitiate the

atmosphere. The removal of such dust would be easier if all furniture stood on castors; but if furniture be not placed quite close against the wall, a stick may be introduced to loosen the dust, etc., so that it may be driven out when the air is stirred.

Another point with reference to the atmosphere in rooms is connected with the flooring and the furniture. Proofs of how eagerly and freely offensive odours are absorbed by wood, which gives them out again whenever wetted, are open to any one who likes to try the simplest experiments. I have no longer any doubt that wood of which the surface is not painted or polished takes up the exhalations of the body in the same manner as do textures of vegetable fibre when used as clothing.

Every one is acquainted with the disagreeable smell of a room in which is rough woodwork, such as register-boxes, deed-chests, book-stands and the like, in (German) government offices. The general ill-health among those who work in these offices, which is ascribed to the sedentary nature of their labour, is certainly not attributable to that alone, but also to the exceptionally bad atmosphere, mainly caused by the very old wooden lumber, charged with evil odours.

All woodwork in rooms, including furniture and flooring (the former not only externally and in front, but also internally and at the back), should therefore be treated with varnish, oil paint, linseed oil, or some similar preparation, which will have the effect of closing the pores of the wood. One of the most important sources of lurking self-poison will thus be removed. Flooring may be first treated with a caustic solution of manganese of potash, and then oiled.

Not a few people object to sitting on upholstered furniture; some find it too warm, others have no further

reason to give than "the unpleasant feeling." Now, all so-called "feelings" proceed from odorous matters, and the materials of vegetable fibre in the stuffing of a well-used piece of upholstery will be found on examination to emit a repulsive smell. Here, therefore, is another source of vitiated atmosphere in living-rooms, which makes itself felt directly the windows are closed.

My sister, resident in New York, has told me that one of the best known German physicians in that city once remarked to her that no house ought to be inhabited for more than sixty years, but should then be pulled down, as it is infested with all the diseases of those who have ever dwelt there. He was right; probably every reader has at some time or other, on entering an old house full of woodwork, been struck by the unwholesome smell. What is then to be done? My readers will scarcely reconcile themselves to the radical remedy suggested by the American physician, nor do I consider it necessary. If all plain wood were to be thoroughly oiled or varnished, I believe that old houses would no longer be haunted by such evil spirits. As regards ordinary upholstered furniture, it would be a great step in advance to discontinue its employment in the rooms usually inhabited, and if new upholstery be procured it should be "Sanitary Woollen." I have had the furniture for my daughter, on her marriage, made in this manner by a firm of upholsterers here, and find that it is easy to effect, without adding to its cost or detracting from its appearance. Ordinary upholstery can also be altered to "Sanitary Woollen," and where material of vegetable fibre cannot be dispensed with, it should be impregnated with suitable oily matter; for instance, with paraffin. Carpets should be used as little as possible, and should be of pure woollen material. I particularly caution against old upholstered heirlooms, to which the remarks of the American physician respecting houses, quoted above, are entirely applicable.

The walls of rooms, staircases, &c., should not be papered, as wall-papers attract evil odours. Moreover, any defective place in the paper forms a haunt for vermin and a trap for dust, and damp walls are a breeding place for mould. Instead of being papered, walls should be sized, or, which is still more wholesome, although technically it presents more difficulties, whitewashed. Of course, oil paint is in itself the best covering for walls, as it would completely prevent their attracting evil odours. But oil paint presents the disadvantage that it just as thoroughly prevents ventilation through the pores of the walls. It is therefore less suited to cover outer walls, but it is the only right thing to employ for a wall which, for instance, separates a room from a water-closet.

In conclusion, I must inflict a deep wound on the housewifely heart. If the nose be applied to white window curtains, even after they have been up a very short time, they will be found to smell like "dirty wash," and are, therefore, just as prejudicial to the atmosphere in the room. Whoever can afford it should have woollen curtains, and whoever cannot has the economical alternative of dispensing with curtains altogether. I have never permitted their presence in my study, and therefore know from experience that they are not necessary.

I may further point out that woollen curtains are free from the danger of catching fire, as they will not flare up like curtains of vegetable fibre, if a flame comes in contact with them.

XLIV.—THE PLATINUM LAMP DEODORIZER.

I have long felt that the difficulty of properly ventilating living rooms in winter constitutes an important obstacle to

the practical carrying out of my System, which, in addition to its title of "Sanitary Woollen," may be termed a "Pure Air," or "Anti-offensive Odours System." The recommendations made in the foregoing chapter may be relied on to effect a very considerable improvement, but even assuming that they are all carefully adopted, the maintenance of a thoroughly pure atmosphere in rooms will still present difficulties, especially in the cold season, when rooms are necessarily kept more closely sealed against the open air. For instance, my own study is crowded with a mass of papers and books, and vegetable fibre in this form is as prone to absorb and give out again noxious exhalations as when it is in the form of rough wood, or of linen. To counteract this and other inevitable causes of the vitiation of the air in rooms, recourse must be had to chemical means of purifying the air, to fumigation with substances known to be destructive of odorous matters, and to diffusion in the air of essences with like destructive properties. One of the best of such essences is ozogen, and an admirable instrument for imparting it to the air, and even for enchancing its effect, is the Platinum Lamp.

This was originally invented by Sir H. Davy while engaged in discovering his Safety-lamp, and is a powerful agent for combating the continual vitiation of the air in rooms, by the breathing and exhalation of their occupants. Its deodorizing influence is especially valuable in sick rooms, or where smoking, or eating and drinking, have filled the air with odorous matter.

The lamp was originally recommended to me as a contrivance for sustaining the diffusion of perfumes in the atmosphere of rooms, and I intended when I purchased it that it should diffuse odours by which I might illustrate my lectures, but I never happened to make the experiment. I, however, determined to use the lamp in order to disperse

about the room that admirable agent for destroying odours —ozogen—and the result quite exceeded my expectations.

The instrument, as patented, is an ordinary glass spirit lamp, with a spiral-shaped thread of platinum resting on the upper end of the wick, so as to be insulated from the wickholder, and kept in position by the insertion of one end in a little glass or earthen tube, situate in the middle of the upper end of the wick. When the lamp is lighted it burns with a flame, but as soon as the platinum spiral glows the flame may be extinguished by rapidly popping the glass cover on and off again, when the platinum spiral will remain in a glow until all the spirit in the lamp has evaporated, for platinum has the remarkable faculty of continuing to glow in warm spirit-vapour.

The practical effect of this is, that as the air immediately surrounding the spiral becomes heated it rises, and is replaced by air drawn in from all sides under the glowing spiral, through which it is compelled to pass, causing the combustible matter contained in the air to be consumed. If half a dozen smokers were to endeavour to fill with tobacco smoke an ordinary sized room in which such a lamp is burning, they would not succeed. The fumes would be constantly drawn through the lamp and consumed. The same thing happens to all odorous matters in the atmosphere of the room. If the platinum lamp be lighted in a room after dinner, however strongly the atmosphere may have been charged with odours, in a few minutes all trace of them will have vanished.

This effect of the lamp in purifying the air was already known to others, and was, therefore, not discovered by me. What I did discover is, that if a small quantity of ozogen be mixed with the spirit, this is not at once consumed, but continuously mingles with the atmosphere in very fine proportions. Its action is then twofold; it destroys all

offensive smells in the atmosphere; and it is inhaled into the body, where it exercises this deodorizing faculty on the noxious odours generated in the body, and especially on the gases developed in the intestines, so much so as to cause to be deferred the period when the bowels are usually moved, without detrimental effect. This last circumstance is strong evidence of the correctness of my doctrine of the ordinary sensations—that they are all, without exception, produced by odorous matters. The necessity in question is locally felt, just as is the opposite sensation of hunger, but is actually due to the odorous emanations from the digested food having reached a certain degree of concentration in the body. The subsequent relief is not merely mechanical, but is caused by the removal of these "noxious" emanations, with their depressing and disabling influence on the whole system. This concentration is retarded by the deodorizing effect of the ozogen dispersed by the platinum lamp. It is a common experience that in travelling, and generally with change of air, the necessity above referred to is absent, even for days; the reason being that the impulse given by the unaccustomed air to the exhalation of the skin prevents the required concentration of odorous matter.

If we consider the great influence on the health of the gases which accumulate in the intestines, and which must be abnormal, inasmuch as healthy wild animals are free from them, the experience described above is highly significant.

I recommend the use of the lamp in rooms which are badly ventilated, or which are filled with odours, such as dining rooms, sick rooms, &c.; also in workrooms, offices, schoolrooms, and in cases where, out of consideration for others, the ventilation is insufficient. Persons who believe that they cannot sleep with the window open, whether on account of cold, or of chronic illness, or because of the

vicinity of some evil-smelling locality, should deodorize the atmosphere of their rooms with this lamp, bearing in mind that when it is allowed to burn too long in a room of moderate dimensions it may induce headache. Lastly, all sufferers from the disorders which I have indicated as arising during the period of digestion will find great relief by burning the lamp.

Directions for use of the Platinum Lamp.

The spirits of wine must have a strength of 168 degrees "Sykes," or the platinum spiral will not glow, and must be perfectly free from fusel oil, which is otherwise diffused in the atmosphere of the room. Many disappointments have been caused by using too weak spirit.

Before lighting a wick for the first time, the wick should be well suffused with spirit. The flame should burn five minutes, in order to draw up sufficient spirit into the wick to keep the platinum glowing. When the flame has burned sufficiently long, the glass cover should be popped quickly on and off again, extinguishing the flame, when the platinum spiral will continue to glow until the supply of spirit is consumed.

The lamp should be protected from draught, but if a light current of air causes the flame to revive, the spirals are too far apart, and should be gently compressed downwards.

To extinguish the glow, the glass cover is placed over it, and should be left until the lamp is again required, as otherwise the spirit will evaporate.

The lamp should not be allowed to continue to glow until all the spirit is consumed, or the wick will char; if, this happens, the charred portion must be removed.

A few drops of Eau de Cologne or other perfume added

to the spirit will be continuously imparted to the atmosphere. The important effect of mixing ozogen, camphor, turpentine, or other volatile deodorizer, with the spirit has already been explained. The usual proportion of ozogen to one filling of the lamp is 15 to 20 drops, but varies according to the size of the room and the number of persons in it. For very large rooms and theatres two or more lamps are required.

Should the platinum wire require to be cleansed, which however, is very seldom necessary, if pure spirit is used, it should be laid, if possible in a glowing state, in diluted muriatic acid, and after a few minutes, again relit, and allowed to glow in the lamp.

The earlier form of construction of these lamps gave rise to frequent complaints of difficulty in making them glow properly; but the expedient of insulation described above has effectually surmounted this objection, and the manipulation of the lamp is now perfectly simple.

The great advantage to travellers of such a ready means of purifying the air of rooms has led to a demand for a portable platinum lamp, and a special construction has been devised for conveyance in the baggage, or even in the pocket, of all who run the risk of living or sleeping in an evil-smelling locality.

XLV.—TROPICAL CLOTHING.

AN article on this subject by the celebrated African traveller, GERHARD ROHLFS, went the round of the newspapers in 1885. I here give a summary of the principal assertions contained in it, and subjoin my own observations in reply.

'Sheep lose their wool in very hot climates and hair grows in its place. Lions and other animals, who in colder regions are furnished by nature with thick fur, have only thin hair in the tropics.

'Men should learn from this that too heavy clothing, and woollen clothing, are not suited to a tropical climate. The body is weakened by constant perspiration, and the skin becomes more sensitive. This is the main reason why Northern peoples find it so difficult to acclimatise themselves in the tropics. The argument of defence against changes of temperature is untenable when the thermometer rarely sinks at night below 77° Fahr. If the early morning dews are feared, india-rubber overcoats or coverlets are sufficient protection without having resource to flannel suits. Flannel is worn in cold regions in winter for warmth, and it is illogical to wear such clothing in the hot zone. Why are the British, who are the chief advocates of flannel, so unable to bear a hot climate? Partly because they indulge to excess in brandy, instead of wine and beer (!), but still more, because they overstimulate their skin by day and night, and thereby enervate it, so that it becomes incapable of the necessary reaction.

'It is not true that the Arabs clothe themselves in wool. A Sheik will put on his whole wardrobe of burnouses, cloths and turbans when he has occasion to enter a town, but when at home he simply wears shirting.

'We should learn from the natives, who merely clothe themselves with strings of pearls, with large leaves, with tanned or untanned skins, &c., &c. Only when they come in contact with civilization do the negroes clothe themselves, and then they use cotton prints, and feel more comfortable than the whites who wear flannel. The value of cotton materials imported to South Africa for the blacks is immense, while flannel and woollen materials find no market, and are not used by the natives. At the large courts in Inner Africa the chief persons wear a quantity of cotton clothing, but the apparel is so constructed as to freely admit the air to the body.

'If, therefore, the climatic conditions and the example of the natives are to be observed, wool should be rejected by man as nature rejects it for the animals; and its place

should be taken by the indigenous cotton, which has the advantage over linen, that it does not retain the wet so long, and therefore is not too chilling in its effect.

'Under all circumstances the pores of the skin must be kept open, and the greatest cleanliness must be observed, for the skin is in the tropics the safety valve of health to a much greater extent than in more moderate climates. Much of the functions of the kidneys is performed by the pores, and it is all the more important not to weaken the latter by excessive perspiration. Especially in damp heat —on the coast or in the marshy districts—would wool be unhealthy, creating a condition similar to a Turkish bath. People enhance the difficulty of living in the tropics by wearing too heavy clothing, and however useful woollen clothing may be in cold countries, in the tropics it is wholly injurious. Let us copy the natives, who content themselves with the least possible clothing, and let us not weaken our skins by wearing wool, like the English, who can consequently only endure a tropical climate for a short time, and are compelled to send their children born there to Europe. It is illogical in hot countries to wear clothing which makes one still hotter. Where cotton is indigenous, let the clothing be of cotton, and where wool grows let it be of wool!'

GERHARD ROHLFS has clearly not thought it worth while to read the writings of the man who has instituted the most exact and detailed researches on the scientific questions which have to be considered in respect of clothing, and who has accumulated more practical experience regarding the hygienic effect of the various methods of clothing than anybody else before him; otherwise it is impossible that ROHLFS would have published the above unqualified statements. Those who are acquainted with my writings will sufficiently recognise the weakness of ROHLFS' arguments, but the publicity given to them makes it necessary that I should at least refute his most glaring errors.

The arguments in favour of cotton, which ROHLFS draws from the animal kingdom would be sensible and intelligible,

if when sheep are transposed to the tropics cotton or grass were to grow on their bodies instead of wool; for the hair which the animals produce in the tropics does not differ in its *material nature* from wool; it consists of horny matter, and its relations to gases, fluids, temperature, electricity, &c., are precisely those of wool. The tropical animals simply teach us to clothe ourselves more lightly, but not to select another material, such as vegetable fibre.

In treating wool and flannel as synonymous terms, HERR ROHLFS most unmistakably shows how superficial is his knowledge on this subject. The difference between flannel and the Sanitary Woollen Clothing which I have devised for a warm climate is precisely that between the coat of an animal in a cold climate and in a warm one, for this reason: wool, like the animal's coat, consists of two elements, viz., the larger, thicker fibres, more in the semblance of hair, and the quite fine, so-called underwool. For flannel both kinds of fibre are used, but in the Sanitary Woollen materials of long-staple wool, the underwool, which constitutes the element of density, is eliminated by combing, which is a reason why clothing of long-staple wool is suited to a warm climate. Further, the rectangular web of flannel necessitates a firm and close conjunction of the threads; and this kind of web offers less resistance to the tendency to the wool to shrink and felt, so that, after once or twice washing, flannel becomes a species of felt. In this respect the stockinet web of long-staple wool acts quite differently, because the nature of the web is five times as porous as that of flannel, and the elasticity of the serpentized threads affords a security for the maintenance of this porosity, which the straight threads of the flannel cannot give; further because, owing to the nature of the web and to the absence of underwool, the shrinking and felting in washing are reduced to a minimum.

The rectangular web of flannel deprives it of all elasticity, and it must therefore be worn looser than the stockinet shirt; consequently the former is more apt to work into folds under the outer clothing, covering the skin in parts with a three-fold layer of flannel, which is greatly too much.

Lastly, all the flannel shirts for daily use which I have ever seen or worn were dyed, and generally with that most vile (from a hygienic point of view) dye, logwood; while red flannel shirts are treated with cochineal (which I only allow to be used for outerclothing, restricting its use as much as possible to purposes of ornament), or even with aniline dyes. The contrast between the natural-coloured stockinet shirt of long-staple wool and such a dyed flannel shirt may be compared to that between day and night. If ROHLFS draws conclusions as to my Sanitary Woollen System from experiences made with such flannel shirts, he displays an ignorance of my System which would perhaps have been excusable five years previously, but which, now that it is known and has been tried in all parts of the world, is scarcely ingenuous, especially as his article on this subject was originally written for a leading German newspaper. What we learn from the animals is simply that lighter clothing is required for the tropics than for colder regions, but both kinds of clothing must be of the *same material*. This is precisely what I have embodied in my System, in that I have caused the thicker shirt, mainly woven of short-staple from the underwool, to be constructed for the winter and for a cold climate, and the much more thin and porous shirt of long-staple for the summer and for hot countries. Thus my System is entirely in harmony with the animals' teaching, and when ROHLFS asks if it be illogical to wear the same clothing in the hot zone as in cold and moderate climates, I ask in reply whether it is illogical to select as clothing in the hot zone

the same material, *i.e.*, animal fibre, horny matter, as in the cold and moderate climates, the former, of course, to be lighter, thinner, and more porous than the latter; this and nothing else is what we are taught by observation of the coats of tropical animals.

Coming now to the arguments which ROHLFS derives from the practice of the natives, I have to say that the example which he quotes of the Arab Sheik is anything but convincing. Nobody doubts that there are occasions when the Bedouin feels too warm in his thick close burnouse, but the question whether the Bedouin would not be better off if he were clothed in a stockinet shirt of long-staple, instead of in cotton shirting, does not appear to have received the consideration of Herr ROHLFS.

While I am on this subject I will insert an extract from an article in No. 52 of *Ueber Land and Meer*, 1885, on the Caroline Archipelago, by a German resident in the tropics:—

"Wherever in these parts the mischievous European influence has not made itself felt, the clothing is limited to a piece of matting attached to a belt, the length of the matting being greater for females. The Ponape women are contented with a showy coloured cloth twisted picturesquely around the loins. At the Mission Stations they have been compelled to adopt semi-European clothing, which everywhere in the South Sea has proved exceedingly pernicious to the health of the natives."

To this I would add that experience has been the same wherever savages accustomed to go naked have been induced to adopt European clothing, and I ask, in what does the destructive influence of the latter consist? Herr ROHLFS says that an immense value of calico, *i.e.*, cotton is imported into tropical countries, which shows that cotton is just as poisonous and injurious to health there as it is with us. Further, I do not dispute that the negro feels more at ease in the calico rag which barely covers his

nakedness, than the white man who is wholly enveloped in flannel, for the former is nearly naked, and that is as I stated long ago, the proper sanitary clothing in Africa. I will here give a further report, from the *Schwäbischen Mercur*, of 9th September, 1885 :—

"On the Cameroon river men and women are clothed alike, simply with a cloth thrown round the loins. Occasionally, in addition to the waistcloth, a vest, or shirt, or kind of petticoat is worn. Much rarer still are trousers. ZÖLLER does not conceal his sympathy for this primitive clothing; he laments that the national costume is destined to be superseded by European clothing. A well grown negro in the costume which King Bell and Manga Bell wear to the present day presents an imposing appearance which would lose exceedingly in European clothing.* The waist-cloths are much better suited than European trousers to the negro, because they look better and are also more cleanly. To me it is incomprehensible that the English Mission could introduce shirts and trousers for their scholars. In my short journeys into the interior I had a good opportunity of comparing and weighing the advantages of both costumes. Those of my black companions who had adopted the fashion inculcated by the Missionaries diffused an odour which was anything but agreeable,† whereas the negroes who simply wore the customary native waist-cloth sprang into the water at every opportunity and kept their skins much cleaner."

So long as Europeans persist in the error of walking under a tropical sun in as complete an outfit as is worn in Berlin *Unter den Linden*, the tropics will continue to be a cemetery for them, while the native populations will be doomed by the curse of imported calico stuffs and ardent spirits to destruction, like the North American Indians; but will Herr ROHLFS maintain that because a big business is done with Africa in calico stuffs, this is any proof of their

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* A striking but well-grounded admission of the æsthetical poverty of our tasteless European clothing! G. JAEGER.

† Of course, because cotton clothing smells offensively. G. JAEGER.

conduciveness to health? In that case he must also credit ardent spirits with being a blessing for these regions, for in them also a big business is done. The rule for the tropics should be as little clothing as possible, but such clothing as is worn must, even more in the tropics than anywhere else, be of undyed wool. I shall continue to hold this view until Herr ROHLFS can prove to me that human beings in the tropics produce no self-poison, or that cotton abrogates in the tropics its property of eagerly absorbing water and malodorous matters.

I am curious to know how ROHLFS can reconcile his requirement that "the skin must always be kept open" with his recommendation of India rubber coats and coverlets.

When ROHLFS says that it is wrong for anybody who has not worn the woollen clothing in a moderate climate, to envelope his body in hot regions with flannel or wool, he is right to this extent: If the change from ordinary European clothing to the Sanitary Woollen System be first made on the occasion of a journey in the tropics, the crises which, from reasons which lie close at hand, arise under some circumstances, may be much more serious than if the change were made at home.

I would further point out to Herr ROHLFS that my assertions respecting the healthiness of the Sanitary Woollen System in the tropics are not merely based on my scientific studies and my experiences in this climate, but also on numerous reports from persons who have practically tried the system in the tropics.*

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* Dr. HUGO TOEPPER writes in "A hundred days in Paraguay," Hamburg, L. Friedrichsen & Co., page 152—"On the occasion of a storm my people were freezing in their thin cotton things, and tried in vain to keep warm by drinking spirits. I emptied the water out of my boots, and felt as well as ever—thanks to Professor JAEGER, in Stuttgart, and his Sanitary Woollen System."

It only remains to reply to ROHLFS' allegation as to the enervating effect of wool. My readers will, however, sustain me in declining to refute for the hundredth time an accusation which is continually renewed, and which rests upon absolute ignorance of what I have so often pointed out as to the hardening effect upon the tissues of clothing made *throughout* of porous wool, in draining from them their surplus water and fat. I will only ask, is the training by means of woollen coverings to which men and horses are subjected for sporting purposes, an enervating process, or is it not rather the exact opposite?*

Could the publication of Herr ROHLFS' article be due to a desire to justify the fact that recently a body of our healthy German marines had been dispatched to Cameroon in cheap vegetable fibre clothing? Here I am reminded of an incident which occurred at the time that I was a student at Tübingen.

The late well-known physicist NÖRREMBERG, an obstinate,

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* The following is extracted from a letter written by a traveller in the tropics :—" Personally I am very decidedly for wool. I have wandered for six months through the hottest regions of South Brazil, in woollen shirt, trousers, boots, a woollen shawl, and a felt hat. I rode daily nearly six hours, through river and swamp, slept in the open air, under rain, and was for months in the worst fever nests, like Pernambuco (where an epidemic was raging), Lococo, and Senegal, in Africa, without having to complain of illness for so much as a minute. I slept with most comfort in a hammock, rolled in my camel hair rug. Now, as I am by no means a Hercules, there must be some reason for all this. I feel very grateful to the wool, especially for the cure of a pulmonary attack. Of course my strict temperance was a great help. . . . . It was delightful to see the natives accustomed to the heat, sweating, groaning, and idly lolling, while I, who am only a poor Northener, accustomed to a cold climate, ran about, loaded and saddled donkeys, made purchases, carried burdens, and in short worked unceasingly, and yet felt no inconvenience."

eccentric man, fell seriously ill, and refused to consult a doctor. His friends begged a leading physican of those days, Dr. RAPP, to see NÖRREMBERG. When RAPP arrived he was received by NÖRREMBERG with the most disrespectful remarks as to the ability of the profession. Without saying a word, RAPP felt his pulse, inspected his tongue, wrote a prescription, and gave it to the patient with the brief injunction, "two spoonfuls to be taken every hour—Good day NÖRREMBERG;" he then took his hat and turned to go. NÖRREMBERG threw the prescription on the ground, and exclaimed: "You quacks understand nothing at all about it!" RAPP turned at the door and said shortly, "The *post-mortem* will show, Good day!" This remark tamed NÖRREMBERG; and I recollected it when I read of the equipment of our marine soldiers. "The *post-mortem* will show!"

XLVI.—WHY WOOL DRIES QUICKER THAN LINEN AND COTTON ON THE BODY.

AMONG the erroneous assertions contained in a lecture recently delivered on clothing, in which my System was condemned, and the praises of linen and cotton were sung, the following may serve as a text for some explanatory remarks on the subject indicated in the heading of this chapter. The lecturer is reported to have said, "Linen "allows water to evaporate with extraordinary quickness, "while wool only does this very slowly. This is best shown "by hanging up wet woollen material and wet linen to dry."

In a reply which I addressed to the Journal in which the report of the lecture appeared, I pointed out that when these materials are worn on the living body their relative

rate of drying is completely transposed, as any one may ascertain for himself. My opponent, however, answered this by alleging that the physical properties of the materials remain the same, whether they are hung on a wash-line, or on the human body. This sort of argument is very characteristic of the class of opponents who, without any practical trial, flatly contradict a fact which every one is in a position to test for himself, such as for instance that the comparative quickness with which wool and linen or cotton will dry on a wash-line is reversed when they are worn on the body. The simplest experiment is to wear gloves or socks, one of wool and the other of cotton; and whoever has worn woollen and linen or cotton shirts has experienced that the first named dries much sooner than the others. Such contradiction of a patent fact can only proceed from school-learning based merely on theory; and when it is maintained that because these materials cannot change their physical properties, there can be no difference whether they are dried on a wash-line or on the warm body, a lamentable ignorance of practical observation is revealed. The relations of an inanimate object, such as a wash-line, to temperature and moisture are always the same, while the living body is furnished with a heat-regulating apparatus consisting of nerves and blood vessels, which are able to make the skin warm or cold, and therefore to affect the conditions under which inanimate objects laid on the skin are dried.

If woollen and cotton materials which have been exposed for some time side by side, on an inanimate object, to an equal temperature be tested by the thermometer, no difference whatever will be detected, while the touch of the hand at once reveals that the wool is warm, the cotton colder, and linen colder still. Whence arises this divergence? The theorist will explain that wool is less heat-

conductive than vegetable fibre, and therefore conducts the heat of the hand less quickly. The inadequacy of this explanation, which rests solely on the comparative heat-conductivity of wool and cotton, can be shown by the simple experiment of wetting both materials. As the heat-conducting power of the water in either material is equal, the contrast in this respect between the materials should rather diminish, whereas, as a matter of fact, the wet cotton feels much more cold, compared with the wet wool, than when they were both dry. If the experiment be made with gloves or socks of both materials, the hand or foot which is covered with wet vegetable fibre remains lastingly colder than that in the wet wool; and the greater heat of the hand or foot clothed in wool causes the latter to dry sooner than the cotton, whereas on a wash-line the case is reversed. This experiment proves that the *physical* nature of clothing material, its *vital stimulating* effect has to be considered. The stimulus imparted by vegetable fibre contracts the cutaneous blood vessels and thereby diminishes the supply of warmth to the skin, while the stimulus imparted by wool dilates the cutaneous blood vessels and enhances the warmth of the skin. Of course a wash-line can as little react on such a vital stimulus as my opponent reacts on my explanatory experiments. But it may well be permitted to ask, what is a man who produces positive facts based on nature and provable by experiments, to do with an opponent who deliberately shuts his eyes and shouts "it is not true?" As to those people or journals who make a show of being impartial in such a matter, they remind me of the Justice of the Peace, who, when one side had stated its case, said "you are right"; when he had heard the other side he said "you are right now"; and when the clerk pointed out that both parties could not be right, the J. P. said "now *you* are right."

XLVII.—CAMEL HAIR.

WHEN I came to recognise the important influence of the colour or dye of Woollen Clothing on the health and working powers, I subjected all woollen textile stuffs to a prolonged neural-analytical investigation, in the course of which I was struck by the remarkable difference between undyed sheep's wool and undyed camel hair. Whereas the nerve-measurement of the former gave an average animating effect of 21 per cent, the average effect obtained from camel hair was 46 per cent. My researches soon elicited communications from practical quarters, pointing to a physiological superiority of camel hair to sheep's wool, and I determined on making an experiment with clothing and bedding of camel hair. The result decided me to give the highest place in my Sanitary Woollen System to camel hair, and this decision has met with a success which I could not have anticipated. What I here state is the result of my experience with hundreds, or rather thousands, of persons. Sleeping in camel hair conduces to a peculiar condition of internal bodily tranquility, which can only result from diminished using up of matter; for nothing, as is well known, consumes so much tissue as internal disquiet. Further, the clothing of the body in camel hair has been found to diminish the sensations of hunger and thirst; that the camel more completely exhausts the nourishment which it takes than do the sheep and other animals domesticated in European countries, is shown by the fact that its dung forms excellent fuel, and therefore consists almost wholly of crude fibre, whereas the dung of sheep, &c., contains matters which cause it to burn with much greater difficulty; and there is good reason

for believing that, when the human body is clothed in camel hair, it extracts in a more complete degree the nourishment contained in the food which has been taken.

The well-known English surgeon BRAID relates in his book on Hypnotism the singular performance of the Indian Fakirs, who allow themselves to be buried alive. He says: "After the Fakir had fallen into a state of ecstacy, his companions enveloped him in a wrapper which they called a 'kumlee,' and he was then laid in the grave. After three days, the saint, to the horror of our officers, actually issued from the grave, wrapped in the covering of camel hair."

Camel hair exercises a more hardening influence on the body than sheep's wool, and disperses adipose tissue more readily. If we consider these various effects, we find that they undoubtedly represent the characteristics of the camel, which is much more moderate in its requirements than the somewhat greedy and almost incessantly feeding sheep. Further, the temperament of the camel is peculiarly placid, and its nature is hardier than that of most animals.

The odour of the camel, as may be readily ascertained by a visit to a zoological garden, is milder, softer, more free from any irritating quality than that of sheep. The musk-like scent of the camel is retained in its hair, and its remarkably soothing, pain assuaging effect is well known in the East. I have made practical application of this attribute, by causing wadding of camel hair to be constructed for healing purposes, and it has done excellent service in cases of rheumatic and nervous complaints, neuralgia, toothache, headache, earache, &c.

Unfortunately, camel hair has not yet been successfully employed as material for underwear, as it cannot be woven of sufficient durability to withstand the severe friction to which it is thus subjected. In the East it is manufactured into thick mantle stuffs, coarse and fine hairs being worked

up together. For the purpose of making a finer web, particularly stockinet web, the coarser hair requires to be removed by combing, and it is this coarser hair which constitutes the main element of durability.

This difficulty does not, of course, apply to the manufacture of camel hair bedding and of the camel hair coverlets and rugs, which I can most strongly recommend, on grounds of hygiene, comfort, and practical use and convenience. (See "Bedding," Chapter 32.) While on the subject of camel hair, I may quote here a communication which I received from a Moscow correspondent in 1883: He says, "In my former travels I found that the Bedouins and Arabs looked down with contempt on our flannel clothing; they frequently jeered us about our unpractical costume, and showed us their's of camel hair, maintaining it to be the best protection for the body; they displayed their sinews and muscles and mocked at ours. I must admit that when endurance, rather than momentary exertion of strength, is in question, the Bedouins are as immeasurably superior to us as is the camel to our European domesticated animals."

XLVIII.—GIRDED LOINS.

A CORRESPONDENT who has adopted the Sanitary Woollen System writes:—"I cannot become reconciled to wearing a belt, notwithstanding that this was generally practised in the Middle Ages, and is still customary with the military, and among the inhabitants of southern countries (although nothing similar obtains among any of the four-footed creation). To wear a belt seems contrary to nature, as it checks the processes of breathing

and digesting, especially of the former in the case of the male sex, whose respiration brings the abdominal region more into play, while the female sex breathe chiefly in the region of the chest. The man's breathing-muscles are attached to the cervical vertebra, the collar-bone and shoulders, and the ribs, which latter they extend and widen. So that, if a belt be worn, only the upper part of the chest is capable of the proper undulatory motion incidental to respiration."

In reply to this I have to say that my experience of wearing a belt has been acquired at different periods of my life. As seminarist and student—a period during which my health was good—I regularly wore an ordinary gymnastic belt, and found that it suited me very well, with the exception that if I took off the belt when I was perspiring I easily caught cold in the part which the belt had covered. This induced pains in the direction of the navel, such as are caused by cramp or colic, without, however, affecting the bowels, and could be very troublesome for two or three days. I consider this to have been an affection of the peritoneum, caused by enervation of the skin of the abdomen, for, of course, at that time I was not clothed in wool.

In the second period of my life—from 27 to 46 years—during which I suffered with my digestion and in my general health, I wore no belt, and could not bear to have anything tight round the loins, because the circumference of the abdomen continually varied; and, after meals, when my dyspeptic troubles commenced, I was obliged to loosen the trousers, although these were made to fit very easily. The pain in the direction of the navel, described above, frequently made itself felt, especially in summer.

About the time that I inaugurated the Sanitary Woollen

System, I was reading the well-known *gourmand* BRILLAT-SAVARIN, who writes amusingly and even instructively, but whose book has as little claim to the title of *The Physiology of the Sense of Taste* as a cook would have to that of "physiologist." I was much struck, however, by the remark, that in cases of tendency to corpulence the wearing of a belt was much to be recommended, not only in the daytime, but also at night. I was aware that corpulence is injurious, and that the body, when constrained, possesses great capacity of self-help. Simultaneously, therefore, with adopting the Sanitary Woollen System, I began to wear an ordinary leather belt about two inches wide, but only during the day. I found that I bore it very well, and as the Sanitary Woollen System caused my dyspepsia, and the puffed-out condition incidental thereto after meals, to disappear, I could maintain the belt equally tight throughout the day without inconvenience. Certain other evils, however, made themselves noticed.

I *felt* that a LEATHER belt was wrong, especially when I perspired, and there gradually arose a disagreeable sensation in the skin whenever pressed by the belt. The test of nerve-measurement (see page 56) by inhalation of the odour of the belt after it had been some time in use explained this sensation, as the result was a diminution of 38 per cent. in the rapidity of the nervous action. I consequently tried a woollen belt of similar width, but it afforded too little resistance, and was soon useless, rolling up and cutting like a rope. My hope that the body would accommodate itself to the pressure of the belt was not fulfilled as I desired; the circumference under the belt continually lessened, so that I had to keep tightening the strain to prevent the trousers from slipping; but above the belt, and to some extent below it, the protuberance was proportionately increased. It was thus clear that this form

of woollen belt did little or nothing to hinder corpulence. In spite, however, of the inconvenience described, I considered that the belt had distinct advantages, as somehow I felt comfortable with it, and during this period, which lasted till within a year of the time of writing (1882), I was free from the pain over the navel previously referred to.

My experiments entered on a new phase during an excessively hot summer. I must premise that I formerly suffered considerably from difficulty of breathing, and from great corpulence (42½ inches round the body). The relief afforded by the Sanitary Woollen System has exceeded all my hopes and expectation, but still I am not completely satisfied. The normal measurement round the body should be 75 per cent. of that round the chest. The latter is in my case 39⅜ inches, and the measurement round the body should therefore be 29½ inches, whereas it fluctuates between 31½ inches and 34 inches, according to my condition and the season of the year. It is thus still about 4 inches too large, and I know that in proportion as it is smaller or larger, I am more or less well.

The difficulty of breathing had also greatly improved, but I was unable to account for the circumstance that when I walked somewhat quickly up hill, I felt—especially in hot weather—a pain at the lower end of the breast-bone, shooting right and left. I had often puzzled over the origin of this pain, and had long accepted a mistaken theory that it arose from some old-standing distortion of lungs and chest, which would accompany me through life, when light was at last thrown upon it in the following manner :—

I was panting up the southern slope of a valley at the hottest period (between 4 and 5 p.m.) of one of the hottest days of the summer, the path being entirely without shade, and the sun burning pitilessly down upon me, when I

suddenly perceived that the pain rose exactly at the junction of the diaphragm with the anterior verge of the chest, and was the natural consequence of the vehement action of the diaphragm. On further observations of my movements in breathing, I remarked that I breathed exclusively in the region of the diaphragm and lower ribs, and that the upper ribs remained almost completely inactive. I now remembered the well-known fact that difficulty in breathing (asthma—in horses, broken-windedness) is caused by a wasting of the lungs which always commences in the tissues of the upper portions; and I had long thought that this affection was due to insufficient use of the lungs. When I further considered that men are much more subject than women to asthma, I had a clear perception of the whole case, as follows:—

Two conditions of breathing must be distinguished: (1) Quiet breathing, when lying down, sitting, or walking slowly, is differently performed by men and by women; at least, this is the case in our state of civilization, although I doubt whether it is so everywhere. Men breathe only in the region of the diaphragm, whereby merely the lower portions of the lungs alternately fill and empty, while the upper portions are inactive. Women, on the other hand—chiefly because the diaphragm is hampered by the corset or by the clothing being tied round the hips—breathe in the direction of the upper ribs, and therefore with the tips of the lungs; this is the cause that women are relatively attacked less frequently than men by asthma. (2) When the breathing is accelerated by strenuous motion of the body, the difference in this respect between ordinary men and women disappears, and the whole of the lungs is called into play.

It is thus clear, that when a man leads a sedentary life and is seldom or never compelled by strenuous bodily

movement to breathe with force, two things will happen. The inactive tips of the lungs will waste away, entailing subsequent difficulty of breathing, and he will become so accustomed to breathing solely in the region of the diaphragm as to lose all facility of breathing in the region of the upper ribs. If an occasion then arise for more abundant respiration, the body will fall from habit into the error of endeavouring to supply this by increased activity of the diaphragm, instead of obtaining assistance from the direction of the upper ribs. The two-fold consequences are: (1) The result is inefficient, because only the lower lobes, instead of the entire lungs, are worked: (2) The vehement movement of the diaphragm produces the pain which I have described.

In considering how this might be remedied, the circumstance that the climbing of ascents induces enhanced activity of breathing led me to think of people who inhabit mountainous districts, and before my mind's eye stood the German Tyrolese (whom I have long respected for their simple and healthy manner of living), with their belt of nearly two hands' width in front. I reasoned that the wearing of so broad a belt limits the possibility of breathing in the region of the diaphragm, and this, whenever the need for breath increases, compels recourse to the region of the upper ribs, thus preventing (1) the wasting away of the tips of the lungs through disuse; (2) the habituation of the body to dispense with breathing in the region of the upper ribs; (3) excessive and painful breathing in the region of the diaphragm.

I at once caused a belt, exactly as broad as that of the Tyrolese, to be made of strong woollen material; and the result surpassed my expectations. The effort of breathing when climbing ascents was greatly lightened, and I was at once entirely freed from the pain in the diaphragm.

What, of course, could not at once be remedied was the wasting away which had, undoubtedly, affected the tips of my lungs. How far this, in the case of a man in his fifty-first year, can be overcome I am unable to judge; and I do not suppose that, especially with my sedentary mode of life, I shall ever become an active mountaineer But the fact remains that I have occasion weekly to ascend a hill $1\frac{1}{4}$ miles long, and 705 feet high. I do this without effort in twenty-five minutes, and, if I exert myself, in twenty minutes. When I also consider that I can trot $1\frac{1}{2}$ miles on a slight descent, I feel that, as an asthmatic subject of many years' standing, I have reason to be satisfied; and I ascribe these results, in the first order to the Sanitary Woollen System, and in the second to the Tyrolese belt.

The belt must be 6 inches broad in front, narrowing on either side towards the hips. The chief difficulty of constructing such a belt of woollen material was the tendency of the broad band to fold together, and thus to lose its efficiency. This has been overcome by inserting pieces of whalebone or steel, and I can now strongly recommend this broad belt to be worn, especially by those who suffer from corpulence and difficulty of breathing.

Abdominal Belts.—In many abdominal complaints, and during and after pregnancy, as also in cases of very corpulent persons, it is serviceable to wear a belt. A good belt should sit well, and give the required support without pressure, and should keep in its place. Obviously, a badly constructed belt which is liable to shift, is troublesome, and fails of its purpose, while if it presses on the abdomen it may do more harm than good. As the same form of belt is not adapted to every case, there should be a variety of systems. I have arranged with a manufacturer who has had great experience in constructing surgical bandages to make his abdominal belts

(in several different forms) of the pure woollen material, so that persons who have adopted the Sanitary Woollen System, and who require an abdominal belt, may procure one which is sanitarily irreproachable; and such belts will be found much more healthy and comfortable, even by persons who have not yet adopted the System. In addition to these belts, trusses and suspensories are manufactured in accordance with my System.

XLIX.—WOOLLEN CLOTHING FIRE PROOF.

EVERY winter brings its sad record of that most terrible form of death, burning alive. So surely as the season arrives when candles are lighted and fires in open grates are kindled, the newspapers present one horror after another. Young children, blooming girls, mothers of families, and the old, all are among the victims of "Death by burning."

In a recent instance, one of two sisters, who were dressing for a ball, caught fire at the lighted candle on the toilette table; the other tried to extinguish the flames, and both were burned to death. In another case, a lady who was walking in the grounds of the London Exhibition, passed over a flaming match, thrown carelessly down by a smoker, and was also burned to death. It would be easy to fill this book with similar authentic horrors, but it will be more to the purpose to point out, that all the agonised deaths and saddened memories which have been due to the clothing and bedding of the victims accidentally catching fire, would have been avoided if the material of the clothing or bedding had been of animal wool, instead of vegetable fibre, as between these two classes of materials there is a very great difference in respect of inflammability.

Cases often occur in which the hair catches fire, but it never burns down to the skin, as would certainly happen with vegetable fibre. If a piece of linen or cotton be held over a lighted candle, as soon as it ignites it burns away with a clear flame until nothing remains but the ash. If a similar experiment be made with woollen material, a considerable time will be required before it will ignite at all, and then the flame is extinguished so soon as the material is removed from the lighted candle. Thus people are fireproof in wool—*i.e.*, their clothing or bedding cannot catch fire; while, when clothed in woven material of vegetable fibre, they are practically torches ready for the lighting.

By surrounding the body, therefore, wholly with material of animal wool, we have it in our power to protect ourselves and those who are dear to us against a calamity which, as is shown by the case above quoted, of the lady who was burned to death by passing over a blazing match thrown on the ground, no amount of foresight can ward off with certainty, when the clothing is of an inflammable nature.

L.—WRITERS' CRAMP.

A FRIEND, who is over 60 years of age, and who has not yet adopted the Sanitary Woollen System in its entirety, writes to me:—"Your account of the effect on your throat of the smell of the paper from which you were reading aloud, set me thinking, as I write daily for several hours, and have always much occupied myself with paper. You may perhaps remember that I have complained to you respecting cold in the hands, especially in the fingers. Particularly when writing, even in a warm room, the cold seemed to penetrate to the bone. My attention having

been aroused by your remarks respecting paper, I laid a piece of woollen cloth on my writing paper, so that the latter no longer came into direct contact with the fingers. I immediately experienced a remarkable improvement, and now, after trying this device for several weeks, I am completely freed from the inconvenience referred to."

This communication led me to suggest that the exceedingly troublesome complaint of writers' cramp, by which many have been deprived of the means of earning their living, and with which medical science has hitherto found it so difficult to deal, is due to the influence of the vegetable fibre of paper, and may be cured by the use of a strip of woollen material under the hand. The accuracy of this conjecture has been strikingly confirmed by the well-known scholar and author Fr. v. Hellwald, who informs me that he has acted on my suggestion, and has since been entirely free from writers' cramp. Others have communicated to a similar effect.

LI.—PATENTS AND ROYALTIES.

A CORRESPONDENT has written to me:—"Frequently when I argue with others, the answer is to the following effect: 'No doubt there is something to be said for it, yet I cannot bring myself to put faith in the System as you do; besides, Dr. Jaeger is so keen on the subject of woollen clothing simply as a matter of business; for he gets a percentage from every one of the woollen drapers and manufacturers.'"

The first condition to induce manufacturers to take up specialities is to protect them by patents, or by registering designs. It is only under such protection that a man of

business will feel encouraged to incur the initial loss involved in the make and introduction of new articles, and subsequently to constitute them an exclusive feature of his trade. Without patents, competitors will at once begin to make and sell goods for which an opening has been secured, and the originator will be damaged, if not ruined.

Inventors who present their discoveries free benefit no one, but do harm to everybody concerned. Firstly, the cause sustains damage, for it cannot be properly advanced; secondly, consumers suffer, since they can never procure the article on reasonable terms with due regard to quality and workmanship; thirdly, manufacturers lose, because their earnings are diminished by the difficulties attendant upon a new process of manufacture. Hence, it is as a matter of public policy, and not in the interest of individual inventors, that civilised states have very wisely enacted patent laws.

It was on the urgent and repeated recommendation of his Excellency Dr. von STEINBEIS, a gentleman who, greatly to the benefit of the community, has for many years occupied the distinguished post of President to the Royal Central Board of Trade and Industry in Würtemberg, that I, too, resorted to this effectual means of protection for my designs; and the sequel very soon convinced me that my adviser had counselled well.

The first article patented was the shirt. The result is that, at present (1880), both in this and other countries, there are establishments in at least a hundred different towns where it can be bought; and every one of these establishments constitutes a centre of propaganda for the Sanitary Woollen System. Considering, further, that these establishments constantly advertise, it will be admitted that, by patenting the shirt, the System has received a great impetus.

No eloquence of tongue or pen would have done as much in ten years to spread the reform as has been accomplished in one year by patenting the shirt.

Touching the question of royalties, I repeat that it was only the legal protection afforded by my patenting and registering which induced manufacturers to work according to my views. But it is the general rule for inventors to receive royalties from business men working their patents. Had I not done so what would have been the consequence?

A man of business regards a refusal of remuneration, where it may honestly be accepted, as foolish. But since I flatter myself upon looking anything but foolish, I should never have had credit for my disinterestedness. I should have been charged with advocating my theories from mercenary motives just the same; while I should have had no compensation for my time and trouble, and for the scoffing and jeering to which I was at first subjected. Had it been eventually ascertained that really and truly I received no remuneration, some would have laughed at me, while others would have pitied me. SCHILLER says:—

"Denn aus Gemeinem ist der Mensch gemacht,
Und die Gewohnheit nennt er seine Amme."

(Man is born of the commonplace,
And nursed at the breast of habit.)

Whosoever, like myself, dares to attack cherished habits must bear the brunt of all the forces of commonplace vulgarity arrayed against him. It is proverbial that those who seek to benefit mankind are badly treated at the hands of their contemporaries. My maxim is, "Rather be hammer than anvil."

I believe that only thus could opposition have been broken down; and the steady and energetic progress of the Sanitary Woollen Clothing reform, surpassing my most sanguine expectations, is the best assurance that I set about it in the right way.

LII.—THE ADULTERATION OF WOOL WITH COTTON.

THE surest mode of detection is by microscopical examination. With a thirty-fold magnifier the least admixture can easily be recognised. The woollen thread appears as a cylindrical body of almost circular shape, with wavy outline; the cotton thread appears flat and ribbon-like, with angular folds, as if crumpled.

A second test, which anyone can apply, is by holding the separated warp and woof to a flame. Pure woollen thread fuses to a shapeless mass before it is consumed, leaving a shapeless ash, and extinguishes directly it is removed from the flame; cotton or linen thread burns steadily on after removal from the flame, and the form of the thread is distinctly preserved in the ash. If a thread be an admixture of wool and cotton, it will burn irregularly.

LIII.—VEGETARIANISM.

THAT whatever is practically good and true finds its greatest enemy in doctrinism, over which, however, it invariably triumphs in the end, is an old story that recurs to me with especial vividness in connection with this subject. My first acquaintance with vegetarianism was in the form of the following doctrine:—

"According to the construction of his teeth, the nature of his digestive organs, and his systematic conformation, man belongs to the genus ape, especially to that of the so-called man-ape. As these animals are frugivora (fruit-

eating), the fruits of the earth must be the natural nourishment of man, for whom meat is unnatural food."

I have always opposed this doctrine on the ground of practical experience, which I will here briefly relate.

I was for nearly five years the technical and scientific director of a zoological garden, and I found that few animals presented so many difficulties in respect of frailty of health as the apes. When I entered on my duties I found that the apes were treated as frugivora—*i.e.*, were fed with fruit, onions, carrots, rice, potatoes, &c., but milk was given to them as well. The result of this diet was, as is stated in the journal of the Frankfort Zoological Garden, an annual mortality of 50 per cent.! The chief, and indeed exclusive, cause of death was pulmonary consumption.

The following observation induced me to adopt another method:—I had two mandrils, which soon after their arrival showed every symptom of consumption (phthisis). As I was watching them one day, a mandril quickly gripped a mouse which came out of a hole into the cage, and devoured it with extraordinary eagerness.

I was reminded by this incident (1) of the successful experience which I had had in treating two tuberculous patients with the so-called "cold-preparation" of Liebig's extract of meat (by no means to be confounded with the Liebig's extract ordinarily sold)—*i.e.*, a solution of meat in $\frac{1}{1000}$ of muriatic acid; (2) that the cravings of the sick are nature's hints, to which the physician should always attend.

From that time I treated all my apes as omnivora, or general eaters, and the result was remarkable. Of the mandrils one, indeed, died after a few weeks, full of tubercles, but the other recovered and survived for over a year; an examination after its death showed that the

tubercles had been arrested, and that the cause of death was heart disease. The main point, however, was that the total mortality of the apes was reduced from 50 per cent to 20 per cent. On my recommendation, my colleagues in the other zoological gardens in Germany adopted the same system, with a similar result. To this may be added that apes in a wild state are by no means exclusively frugivora, but are eager and alert to consume all kinds of insects, worms, snails, birds' eggs, young birds, mice, &c.

I was therefore firmly convinced that the vegetarian doctrine is erroneous, and I was strengthened in this view by the fact that my chronic dyspepsia distinctly improved when I began to avoid potatoes and farinaceous and leguminous foods, from which I suffered most inconvenience, and to keep more strictly to a meat diet.

This was my position on the question of Vegetarianism, at the time that I made my researches into the action of odorous matters, and published my theory of the Sanitary Woollen System. Here, again, troublesome doctrinism at once showed its hostility to what is practically good. The Sanitary Woollen System was vehemently attacked by the doctrinists of vegetarianism. This availed, however, as little as did the doctrinary assaults which were made from other quarters: the practical value of the System forced recognition, and not from the "omnivora" alone, but especially from vegetarians, in spite of the opposition of their doctrinary leaders; so that a year ago (1881) the admission was made in the vegetarian journal, the *Naturarzt*, that the Sanitary Woollen System had become a power which must be taken into account.

I have since been continually in contact, both personally and by correspondence, with vegetarians, luckily not with the doctrinists, but with common-sense, rational people, whose maxim is, "Examine everything and retain the

best." From the communications I thus received, detailing personal practical experience, which I value higher than any doctrine, I arrived at the conviction that the doctrinal and the practical aspects of vegetarianism are not in congruity—that is to say, that the vegetarian mode of life can show great practical results, but that the doctrinal foundation on which it rests is erroneous. These communications, together with my progressive knowledge respecting the nature of disease and cure, and the practical experience (now first fully comprehended) which I had with animals, as medical superintendent at the zoological garden, greatly changed my attitude towards vegetarianism, and assisted me to a different, and, I believe, a more scientifically correct fundamental reason for the vegetarian mode of life.

My readers are acquainted with my maxim, "Disease is stench"—*i.e.*, everything mal-odorous either causes or disposes to disease, and this tendency is enhanced in proportion to the offensiveness of the odour. The cages in any zoological garden or menagerie afford ready proof that the excrement of carnivora is more offensive than that of frugivora. The manifold experience with dogs shows that this difference does not proceed from the specifically diverse natures of carnivora and frugivora, but from their diverse food. The exhalations from dogs, especially big dogs, which are fed with meat, are so offensive that the animals cannot be endured in a room; and it is an almost universal rule to feed only watch-dogs with meat, and to restrict house-dogs to a vegetarian diet, *although such is not their natural diet.* It might be supposed that this unnatural nutriment would disagree with house-dogs, but precisely the reverse is the case: those (principally little dogs, whose exhalations are less perceptible) fed with meat are in no way healthier than those who are compulsory

vegetarians; on the contrary, the former have a disposition to eruptive diseases, digestive complaints, inflammatory disorders, hemorrhoids, &c.

The popular expression for these well-known facts is that "meat is too heating for dogs;" and yet no one will dispute that dogs, as appertaining to the fox and wolf species, with similar formation of the teeth, intestines, &c., are naturally carnivorous. The explanation of this apparent contradiction is, that every creature has its so-called natural food, but so soon as it is withdrawn from its natural surroundings, and placed in a condition which is not natural to it, a change of diet is necessary. This is especially true of carnivora, but is also true of frugivora. It is well known, for instance, to cattle breeders that hay is more wholesome for stalled cattle than green food, and yet the latter is the natural nutriment.

To man's physical nature the same laws apply as to that of the animals, as any one who is not already convinced can prove on his own person. The odour of the evacuations, as well as of the exhalations, is much less penetrating when the diet is vegetarian than when the body is nourished on meat. This I consider to be the reason of the undeniable success of the vegetarian mode of living in numerous cases of illness, and to constitute its hygienic importance; for, as with the house dog, so with most civilised men, they live within four walls, and are thus liable to be injuriously affected by their own exhalations in proportion as these are mal-odorous.

Vegetarianism therefore contends, although this has not hitherto been clearly perceived, with the same enemy that is attacked by the Sanitary Woollen System; and it was thus in the natural order of things that among vegetarians the System at once found enthusiastic adherents. The "noxious" emanations of the body were the impelling

cause to vegetarianism, and some found therein a remedy for their complaints, while others, when the external and internal conditions were less favourable, experienced only alleviation; and these latter, with accurate instinct, adopted the Sanitary Woollen System as a means of perfecting their cure.

To the question whether, on the foregoing grounds, I recommend vegetarianism, I can reply neither in the affirmative nor the negative, for the following reasons:—

The suitability of a particular form of nutriment to man cannot be decided solely by the nature of the emanations which it evolves; the degree of its digestibility and of its nutritious quality must be taken into account. In these respects flesh foods, as a class, are distinctly superior to vegetable foods, although very fat meat is more difficult to digest than many kinds of fruit, and in point of nutritiousness legumes are very little inferior to meat; but, on the whole, the above statement holds good. When, therefore, the conditions of time or space require that the nutriment should be intensive, meat is distinctly more effectual than a purely vegetable diet; and most vegetarians have practically admitted the inadequacy of the latter, by adopting two of the most nourishing and easily digested animal foods—milk and eggs.

I therefore go thus far with vegetarianism:—For those who suffer from the evolution of the "noxious" emanations two courses are open, the Sanitary Woollen System and vegetarianism. Either or both may be chosen. I consider that vegetarianism is especially suited to the constitutions of people who lead indoor lives, and the lightness of whose occupation creates in the body a relatively small need of nourishment; in short, people whose calling compels them to be idle indoors—as, for instance, persons who have frequently to wait in a condition of complete inactivity for

orders from their chiefs, or those who have only light, uniform occupations, as copying, sewing, knitting, reading, &c.

On the other hand, I should dissuade those who work hard, physically or mentally, or who on other grounds require easily digestible intensive nutriment, both from a purely vegetarian mode of living, and from restricting their diet too exclusively to meat; such persons require a mixed diet, and should adopt the Sanitary Woollen System.

Between the extremes of hard and light workers there will be many cases in which I can only give the advice both as to vegetarianism and the Sanitary Woollen System which I myself have always followed to advantage, "Examine everything, and retain the best." I have been reproached with riding an excellent principle to death, but my only principle is the foregoing maxim, and I admit that I am willing to ride this at all times. My practice as a public teacher and adviser is not to recommend that which I and many others have recognised as the best, with a demand for unconditional acceptance and submission to my authority. I simply say, "Here is something which many have approved, and which is therefore worthy that others try it." I only ask that the trial shall be correct and thorough. This is my position in reference to the Sanitary Woollen System, and from this standpoint I have discussed vegetarianism.

LIV.—EATING AND DRINKING.

IS it not surprising that, whereas every wild animal, without any instruction or previous knowledge, at all times discovers what food is suited to it, there should be in the so-called era of exact research, such confusion of opinions as to what Man may eat and drink? a confusion which

becomes greater in proportion as chemists heap analysis upon analyses, and physiologists institute experiment upon experiments.

This anomaly sufficiently indicates whither we must turn for enlightenment on the subject; we must endeavour to learn from the animals which live wholly free from artificial influences, and which are guided solely by their instinct, how and by what means they discover with such certainty the food that is suitable to them. The answer is simple; the animal seeks its food with its nose. By help of its sense of smell it discovers its food, even when the latter was previously wholly unknown to it, and the same sense enables it to recognise the converse of food—namely, poison, and whatever is injurious to it. The question whether Man can make the same use of his sense of smell is one that may be solved without any course of learned study; a few experiments, which each reader can at once institute, will suffice.

1. Everyone knows that certain foods agree with him, and everyone is acquainted with certain venomous plants, or other poisons. If such objects be tested with the sense of smell, the odours of the wholesome foods (with the reservation mentioned in the next paragraph) will be found to be without exception, agreeable; while the poisons and unwholesome foods are mal-odorous. For instance, all eatable fruit, such as pears, apples, strawberries, raspberries, oranges, &c., is distinctly fragrant; while all poisonous berries, however inviting their appearance, such as deadly nightshade, the herb Paris, &c., smell offensively.

2. To a hungry man the smell of suitable food is attractive and agreeable. On the other hand, the same food will smell disagreeably to the same person when once he has assuaged his appetite with it (the windows are thrown open after a meal to get rid of the "disagreeable smell of

dinner") ; and in a condition of satiety, it would be injurious to continue taking the food.

3. A sick person may be injured by taking food which agreed with him perfectly when he was healthy, and of which the smell is now, in his sick condition, repellent to him. To this may be added that, while offensive odour infallibly indicates that the object is unfit to be enjoyed, or is generally prejudicial to health, fragrance, on the other hand, does not of itself prove an object to be eatable ; for instance, most flowers are fragrant, but we do not think of eating them. If a thing may be eaten, it must, in addition to its fragrance, awaken a feeling of appetite or desire to eat it ; this familiar sensation is accompanied by increased flow of saliva ("the mouth waters"), and by involuntary movements of the organs of the mouth, especially of the tongue.

We see from these facts that Man, in his sense of smell, has, however circumstanced, a means of recognising whether a food will agree with him, and this not only qualitatively but also quantitatively ; the sense of smell suffices of itself to indicate to him when he should cease to eat, namely, so soon as the odour of the food ceases to be agreeable to him.

The sense of taste performs the same service, and, especially in respect of ceasing to eat, is much plainer in its admonitions than the sense of smell ; for immediately enough has been taken, the agreeable taste of the food is converted into a feeling of disgust ; and everyone knows, or can readily ascertain by experiment, that if this feeling be disregarded and the same food continue to be eaten, either the stomach will be upset by over-eating, or at all events there will be inconvenience during digestion.

From the foregoing may be laid down some general rules, which apply as well to drinking as to eating.

1. Before eating and drinking, the odour of the food or drink should be inhaled; and if the odour be agreeable, and create a feeling of appetite, the food may be taken, while it should be rejected if the odour repel.

2. Eating and drinking should cease when the taste is at its best. The proverbial injunction to "leave off while you are hungry" is perfectly correct, for if eating be continued until the feeling of disgust makes itself plainly felt, this feeling is a symptom of poisoning. 3. As there is no food which equally agrees with everybody, and as even within the limits of a single family the most various tastes are represented, according to age, sex, and idiosyncracy, human beings cannot be uniformly fed like cattle; allowance must be made for this difference of tastes, and it should be a rule that *no one be forced to eat.* If ten people sit at table, the fact that a dish is agreeable to nine of them is no proof that it must suit the tenth, who may be either sated, or ill, or may possess an idiosyncratic aversion to the food; and in all three cases the tenth person would be injured by partaking of the food. The practice of forcing food on guests and on children is a mischievous one, especially in the case of the latter, whose health is too often sacrificed to the senseless preconception of parents, that children must eat what is put before them; and the deleterious consequences would be much more common if they were not frequently allayed by the child's stomach revolting against this violation of nature's law, and throwing up the unsuitable food. The proper course to pursue with children is never to force them to fill the stomach, or to appease their hunger, with food to which they are averse; but the endeavour should be made on every occasion to accustom the child to the food. This does not necessitate eating considerable quantities of it—tasting is quite sufficient. The maxim that children must eat what is put before them

should be changed to *children should taste everything which is put before them, but should only appease their hunger with food which they relish.*

It will be objected that it is impracticable, especially in large families, to study the individual taste of every member; special dishes cannot be cooked for each one. It involves very little extra trouble to serve, in addition to the cooked dishes, bread, butter, fruit, eggs, and milk, or at least to have them in readiness. Not only are bread and fruit alone an excellent diet (with the reservation mentioned below), but most children eat them willingly, and if a child is averse to the dish offered to it, the substitution of, say, some milk and bread, is not a very serious matter.

Moreover, the regular supplementing of the fare with food which does not require preparation directly conduces to the health of the mistress of the house, especially when she herself prepares the meals. Every observant housewife knows that the continued inhalation of the smell of the cooking destroys her appetite for the food which she nas dressed. This is also the case when she does not herself cook, but superintends the cooking; and she eats with much more appetite when in a hotel, or when dining out as a guest. Every experienced family doctor knows how frequently the housewife, in the middle classes, suffers from complaints which are in many cases due to nothing else but loss of appetite, due to the smell of cooking, the sufferer not having sufficient insight to seek a remedy in food with the preparation of which she has not been concerned; such food may be purchased ready cooked, or may be taken in the form of fruit, or of eggs, which do not develop any powerful odour in cooking. Most women concerned with cooking instinctively prefer some alternative to the food served for dinner, and eat more at odd times than at the regular meals.

It results from the foregoing that in the interest of the

mother as well as of the children, less importance should be attached to the preparation of dishes for the chief meals, and more to foods which require little or no preparation, and may be eaten at other times, such as at luncheon or early supper. I lay especial stress on fruit, which children should eat daily, if possible fresh, or at least preserved.

A further important precept in respect of eating and drinking has reference to the necessary variety. The law of nature by which this is required has already been discussed on page 98, and it will, therefore, be sufficient now to deal with the practical aspect of the question, of which two phases have to be distinguished.

1. Variation of Quantity.

I here touch on a subject which has ceased to be understood among those to whom the term "educated" is usually applied. I say ceased to be understood, because formerly, prior to our culture becoming overgrown with that learning which takes too little account of nature's laws, the importance of Fasting was more clearly comprehended.

This was at a time when the priesthood everywhere formed and superintended the manners and customs of the people, establishing these customs under the ægis of the highest—divine—authority; and although I firmly hold to the Protestant religion of my forefathers, I do not hesitate to declare it a misfortune that Protestantism has relinquished all care for the bodily welfare of its adherents. Anyone possessed of the self-control necessary to make a trial of fasting will at once be convinced of the extraordinarily beneficial influence which is thereby exercised on the health and working powers, not only with such persons as banquet luxuriously, but with all classes, down to the peasant and artizan. Where fasting was, and is, prescribed by

religion, it takes the form 1. of a weekly fast-day; 2. of a yearly fasting period; and both forms are, from a hygienical point of view, absolutely correct. During the fast, opportunity is afforded to the body to purge itself of the gross and subtile residue of its every day nutriment. That is in itself a species of recuperation, and the other recuperative element consists in the abrogation of a state of equipoise always allied with a depression of the vital energy, which recovers so soon as the state of equipoise is disturbed.

Not only can fasting restore the lowered vital energy, but it is in fact a remedial treatment directly indicated by Nature; for in most illnesses the customary food smells disagreeably and excites disgust. One of the chief symptoms of illness in an animal consists in abstinence from food, and every conscientious and intelligent physician prescribes in most cases fasting or meagre diet. What has been lost sight of is, that this rule is not simply a cure, but is periodically necessary to counteract the accumulation of that which is termed tendency to disease. In short, I advise everyone to fast at regular intervals, if only by omitting on one day in the week the midday meal; or at least to observe a day of fasting when he notices a diminution of vital or working vigour. Especially is fasting to be recommended as a preparation for strenuous mental exertion. I say this from my own abundant experience. For years I have made a rule of observing a fast-day prior to starting on a lecturing tour, and on the day of the lecture to take nothing after breakfast until the lecture is over, at most drinking a little; indeed every such tour is practically for me a time of fasting, and to this I mainly ascribe my retention of bodily and mental vigour under very severe exertion. It would be well if the observance of a weekly fast-day could again by custom become an ordinance, and where the practice still holds good, every

effort should be made to maintain it. *I consider the Fast-day as hygienically imperative as the Sunday rest.*

2. Variation of Quality.

It has been established by observations with animals, by experience in prisons, and by innumerable facts occurring in daily life, that all uniformity in eating and drinking acts prejudicially on the health, and that every variation in this respect is gladly welcomed by the entire organism. Hence the Latin maxim, *Variatio delectat*, "Variety is pleasing;" and I would emphasize this by saying, *Variatio delectat et roborat*, "Variety is pleasing and invigorating."

The question of variation of quality is not one of luxury and epicurism; on the contrary, the simpler the meals the greater the possibility of varying them. Whoever eats, say, 1st day, bacon and peas; 2nd day, roast meat and potatoes; 3rd day, curds and bread; 4th day, fish and potatoes; 5th day, cold meat and bread and butter; 6th day, soup, boiled beef, and vegetables; 7th day, farinaceous food and fruit; can procure a much greater variation of quality than by partaking of five or even ten different dishes together. In judicious family circles importance is attached to varying the meals, but the ordinary bill of fare of eating houses, &c., is arranged with sadly little intelligence in this respect.

The above applies not to eating alone, but also to drinking. At the present time a great deal is being written and spoken against the increase of alcoholism. It is generally overlooked that the *sameness* of the drink constitutes, equally with excess in the quantity, the deleterious element in drinking. Not only those who indulge too freely in alcohol become victims to its destruction of body and mind, but also they who are addicted to one exclusive form of alcohol; and the ruinous effect is developed more

quickly, and in a greater degree, in proportion to the uniformity of the drink. This especially applies to spirits and beer. The habitual beer drinker, as well as the dram drinker, falls into a condition of chronic disease. The danger to wine drinkers is not so great, for even when a man drinks year after year the produce of his own vineyard, the monotony is much less than in the case of dram and beer drinkers, not merely because the vintage varies from year to year, but even any one vintage continually alters in its development from the condition of must to that of maturity. Whoever values his health should practice a sensible variation in his drink; he should alternate not only the kinds of alcohol, of wine, beer, or must, but he should include water among his list of varieties, in analogy with the Fast-day. While on this subject I will also refer to the rule that the daily drink should consist of light beverages; strong drink is just as injurious as excess, which, however, need not altogether prohibit the occasional moderate use of strong drink, if only for the change thus introduced.

One more remark as to wine: red wine is in general more wholesome than white wine, but it should be made a principle always to drink red wine mixed with water.

LV.—HEALTH RECUPERATION.

IN closest connection with what has been said respecting variation in eating and drinking must now be entered a plea for the necessity of variation in two other directions, in the interest of health and of the maintenance of the working powers.

1. Change of Air.

Air is a yet more indispensable vital element than eating and drinking, for if we are deprived of it, if only for a short

time, we are lost. We have, moreover, in the course of this work, become sufficiently acquainted with the fact that good and pure air is one of the prime conditions of remaining healthy, and that close, impure, mal-odorous air is one of the most treacherous causes of disease. I say "treacherous," because, although people may accustom themselves to it, they can only do so at the expense of successive sacrifices of their health and working power, with the certain prospect that some day the accumulated effects in the body will, as it were, overflow, when an inflammatory disease will lay the victim on a sick bed, or consign him to the grave. These considerations, however, do not exhaust the importance of the subject of air, as will be seen by what follows :—

We saw above that even the most suitable food will not sustain a man's health and working power, if he exclusively nourishes himself with it for a lengthy period: experiments with animals teach that in extreme cases they will, when thus fed, die of hunger. A similar, if less extreme, result follows if a person remains continuously in one and the same air. The only reason why the consequences are not so severe as in the case of food, is that the changes in the weather never permit of an absolutely lasting uniformity in the quality of the air. But it is precisely from the variations in the weather that the important influence which change of air exercises can easily be observed. Every one who takes a little notice of his own condition is aware that even the apparently finest weather, if it remain quite the same for a lengthy period, induces depression of vital energy, a state of weariness, a feeling of disgust; and that a change of weather constitutes an actual deliverance.

Equally well known is the exhilarating feeling, after remaining for some time in a closed room, of going out into the open air. That this is not merely due to the fact

that the air in the room is bad, and the outer air good, is shown by the converse case; if a person has spent the whole day in the open air, and especially when, in a campaign, several days together are thus spent, he welcomes with delight even the most mal-odorous quarters, because they afford a change which disturbs his state of equipoise. On a walking excursion it will be found that, after a long interval of open fields, the air in the woods is greeted with joy; but if hours have been passed in the close air of the woods, it is refreshing to once more traverse the open fields.

These simple observations should direct our attention to change of air as a recuperative element; and for persons whose occupations keep them indoors the necessity of a daily "constitutional" in the fresh air is recognised. It must not, however, be supposed that this will suffice to maintain the working capacity at its highest point. The body has an astonishing faculty of accustoming itself even to a change, when that change preserves a certain uniformity; and this is equivalent to a diminution of the vital energy. People who are the slaves of a certain routine are not usually considered to possess a high degree of working capacity and of health, but rather to suffer from depression of vital energy. This implies that the regular daily "constitutional" is not enough; the daily change of air must be supplemented by a weekly change differing from that of every day; and to this again should be added a half-yearly, or at least yearly, more complete change of air, such as is procured by holiday tours, &c. The more thorough the change, the more fresh are mind and body maintained. That the Emperor William of Germany retains his mental and bodily faculties so unimpaired at his great age is not a little due to his alternating the air of Berlin with that of Wiesbaden, Baden-Baden, Ems, Gastein, and Babelsberg.

This brings me to speak again of the hygienical ordinances of religion. The Catholic Church, in prescribing pilgrimages, did not lose sight of this element of change of air, and provided for it in a manner which rendered it obligatory on all classes and ages. Our worldly institutions supply something similar, in the shape of the army manœuvres, but unfortunately these affect only a very limited portion of the population. The scholastic and legal vacations tend in the same direction, and afford the opportunity to many people of change of air, but not to the extent to which this could and should be the case. An improvement in this respect has been effected by arrangements to facilitate access by the poorer classes to the advantages of change of air, but it is only a drop in the ocean of sluggishness and want of understanding of these matters. There should be an organisation for extending the practice of change of air, similar to that which was formerly provided by pilgrimages.

2. Change of Occupation.

The fact that Nature imposes fatigue as an interruption to every kind of activity, and alternates the daily work with the nightly sleep, is of itself an indication that Man is not a machine capable of sustaining a continual, uniform progression; and anyone who makes observations and institutes experiments on this head may easily convince himself that the question is not merely one of action and repose, but also of variation of action, both as regards quantity and quality. Hard work must not only be varied with rest, but also with lighter work, and the effect is most recuperative when the variation is, further, qualitative; for instance, when head work is exchanged for hand labour; hand labour for foot exercise; the ordinary occupation or

profession for what is termed "working for one's own pleasure;" mental or physical labour for pleasure or social enjoyment. The man whose occupation is a monotonous round of working, eating, and resting soon falls into the morbid condition of a "slave to routine," and this is why institutions are common in all civilised societies, which render practicable this alternation of employment, with its recuperative influence. It is one of the mistakes incidental to the secularising of these institutions, that, owing to want of intelligence and to avarice, their utility is questioned. Sunday is an institution of leading importance in providing for change of occupation. Where the Sunday rest is not observed, apart from the moral consequences, the working powers and health of the community are so reduced that the advantage of the Sunday labour is more than lost through the general diminution in working capacity; and wherever the institution of the Sunday rest has been permitted to lapse, energetic efforts should be made to restore it, on hygienical and national economic grounds. I go further, and plead on the same grounds for re-establishing the irregular holidays, simply because the regular Sunday rest is not sufficient. As stated above, the body has the faculty of accustoming itself to every regular recurrence, and regular Sunday rest cannot alone prevent men from sinking into slaves to routine; irregular intermissions of labour are required, and these the irregular holidays provide. If men were machines, the sum of whose performance depended on the number of hours they worked, the contention would be just that the observance of 18 secular holidays in the year would be equivalent to a diminution of 6 per cent. in the annual production; but the condition of the health and the working power is a leading factor in the production by human labour. Take the first named factor —health. The average number of sick days per head

among soldiers, who are in the most vigorous period of life, and whose occupation is of the healthiest nature, is 14, and I believe I do not err in estimating double this average number of sick days for the working classes, which gives a loss of about 8 per cent. of the time which might be devoted to labour. I am persuaded that no inconsiderable proportion of this loss of labour might be saved, if the people could again have the hygienical institutions which have been lost to them in these uncomprehending, doctrinary modern days. We see in our own children the animating effect of an irregular holiday which is really used for the purpose of recuperation; and what is good for the child in this respect is equally good for the adult, who indeed requires such opportunity for recuperation more than does the child, as soon as he is past his prime. It is therefore time that an energetic "thus far and no further" should be opposed to the senseless indifference to the health and working power of the people displayed by insatiable seekers after gain. So long as this is not undertaken by the authorities, let no one, either for himself or for those around him, allow work to make him unmindful of the necessity of opportunity for recuperation of the vital forces; otherwise he will be living on his working capital.

LVI.—HYDROPHOBIA, AND THE PASTEUR TREATMENT.

IN my writings and lectures I have advocated the view that, in contrast to the fatty matter which the skin excretes, and which contains the body's self-medicine, the watery perspiration is especially the means by which poisonous matters—whether self-poison or introduced from without—are exuded from the body. This is why sweating has

always been considered a healing process, while suppression of the secretion of sweat has been regarded as injurious. To a great extent the proper understanding of the importance which thus attaches to the function of sweating has been lost sight of; and I therefore recommend to my readers' attention the following extract from No. 8 of the *Fundgrube* (*Mine of Wealth*), 1886 :—

"The English lady physician, Miss KINGSFORD, has addressed a letter to the *Pall Mall Gazette*, in which she restores to light a dissertation on Hydrophobia, by the French physician BUISSON, in the year 1855. BUISSON had noticed that this form of madness is peculiar to the dog and cat races, and that these animals never sweat. He further knew that the poison of snakes, spiders, and scorpions may be rendered harmless by a treatment frequently successfully adopted where the poisonous creatures named are indigenous. Lastly, he was aware that the ordinary poison of smallpox does not act when the person inoculated is at once placed in a sweating bath, and that malarial fever and similar diseases are often cured by the treatment in question. He soon had occasion to make the experiment on himself. Some foam of a sufferer from Hydrophobia, to whom he had been called, fell on a spot where his skin was scratched; before long he felt frightful pains, and all the symptoms of Hydrophobia were presented. After the approved remedies had been found useless, he went into a Russian sweating bath at 124° Fahr., and soon fell into a perspiration, when the symptoms moderated, and finally ceased altogether. He could again drink, was able to sleep soundly, and the next day was quite well. From that time he cured Hydrophobia by the sweating treatment, and in a short period treated 80 cases with complete success. In his dissertation on the subject he states that the experience of a lengthy practice had taught him that the disease generally lasts three days after it breaks out. On the first day cure by means of ample perspiration is certain, on the second day uncertain, and on the third day nearly hopeless. But who that is acquainted with a certain cure would wait for the third day?"

To this important communication I add an extract from a recent publication by Graf von der RECKE-BOLMERSTEIN, in Silesia, who confirms BUISSON'S assertion that the most

ready and certain remedy for a bite from a mad dog is a sweating bath :—

"The sweating bath is equally applicable to snake bites, as I have myself experienced. In proof that there are poisonous snakes here, I may state that a woman was bitten by an adder in the calf of the leg, and in spite of medicinal treatment died after five months. The thigh on the side which was bitten was swollen and blackened up to the abdomen. Four years later a girl was also bitten by an adder. I heard of it on the following morning, and found her much swollen on the side affected, and in a state of giddiness. I at once ordered a sweating bath, and found her quite lively the next day, without any swelling, and she has remained healthy until now, 12 years after. Six years ago a woman was badly bitten by a dog, which was undoubtedly mad, on the upper part of the bare arm; as soon as I heard of it I ordered a sweating bath, and she became and has remained perfectly well. I am of opinion that the sweating bath is a certain cure for all blood poisoning however caused."

I subjoin another newspaper extract from the *Casseler Allgemeinen Zeitung*, of 27th June, 1886 :—

"A man in New York who was bitten by a mad dog, and who did not believe in Hydrophobia, has related his experience, authenticated by a well known physician, to a representative of the *New York Times*. The dog which bit him was pronounced by medical evidence to be unquestionably mad, but the man was convinced that people in similar cases die of fear, and he determined to combat this fear with all the strength of mind he could command. He took cooling drinks, and would not allow himself to get excited. After eight days his doctor was dismayed by a change in the patient's expression. The patient himself felt violent pains in the eyes, the pupils of which became so dilated, and his sight so keen, that he could read the smallest print without glasses, for the first time for twelve years. After the eighth day great restlessness and feverish excitation were noticeable; he felt as if he must bite or attack some one, and he carefully kept out of the way of everybody. Some nights after, when sweating violently between blankets, he experienced pains throughout the whole body, and a feeling came over him as if he must fly out of bed, or throw himself into the water. During this crisis he held himself down for four hours, with both hands fastened to the sides of the bed,

exerting all his physical strength. At last the pains left him, the fever-heat vanished, and he felt himself wonderfully relieved; the blankets in which he had been wrapped were saturated with perspiration. When the doctor came again he was dumb with astonishment to see his patient perfectly well. The patient is convinced that an excited imagination and a want of strength of mind are much more conducive than the bite of a raging dog to an outbreak of Hydrophobia in the person bitten. The doctor who watched the case admits that he is astounded at the recovery, and believes that even if the patient is not absolutely restored to health, he is at all events out of danger. The hygienic success of the cure is ascribed by the doctor, next to the astonishing behaviour of the patient, to the intense natural sweating bath during the crisis of the disease."

Among the journals which reproduced Miss KINGSFORD's letter to the *Pall Mall Gazette* was the *Dresdner Nachrichten*, in whose subsequent issue of the 28th November, 1886, appeared the following letter from a Dresden physician, conveying a striking corroboration of my theory as to the importance of the sweating function, and the power of the watery perspiration to carry off self- and extraneous poisons:—

"I am able from my own experience to furnish a parallel case to the cure of Dr. BUISSON. Some twenty years ago I had occasion to dissect the corpse of a person who had died of dropsy. I was greatly pressed for time, and slightly injured the skin of my left hand. I felt a weak, biting pain in the small wound, but forgot the matter in my hurry. A few days later I was attacked in the morning by a severe shivering chill, which returned in the evening. This was the symptom of the resultant blood-poisoning! In the following night there broke out, quite of its own accord, a tremendous outburst of perspiration, and at the same time I felt the glands in the left armpit to be swollen and painful. The sweating was accompanied by unquenchable thirst and craving for cold water. The next morning I called Dr. PÖBING to my aid, and we agreed that I should continue the abundant drinking of water. The sweating and the drinking of enormous quantities of water (without taking any nourishment) lasted three whole days. On the fourth day the thirst, the sweating, and the pain in the armpit ceased. I was saved!"

It does not seem that up till now (March, 1887) the PASTEUR treatment has resulted successfully. According to my judgment, PASTEUR, like inoculators in general, has followed a correct principle, but has overlooked a second principle which must necessarily be associated to the first. The first principle, correctly grasped, is that of Similarity, *i.e.*, of combating a disease, either by using the same matter as that which has caused the disease, or by a matter whose poisonous effects are similar to those of the disease. The principle which he has failed to see, and which must be necessarily associated to the foregoing, is that the matter with which the disease is combated must be highly attenuated. PASTEUR had some notion of this, for he wished to *weaken* the virus of Hydrophobia with which he inoculated, but between *weakening* and *attenuating* there is a difference as between heaven and earth. I will take the opportunity which this subject affords me to awaken intelligence for my doctrine of the "specific matter," which is so little understood.

In connection with what PASTEUR terms *weakening*, has to be considered that which I have designated as impregnating (*Verwitterung*), or, in the case of human beings, as "humanising." The most analogous instance of this to PASTEUR'S treatment is the indisputable fact, known to every apothecary, that if a venomous plant be reared in garden soil, its poisonous property will be greatly weakened. My explanation of this, which is supported by all allied phenomena of biology, is that the garden soil is impregnated with human matter, and that this human health-matter penetrates from the soil into the venomous plant, which, because it contains the human health-matter in the most potent, *i.e.*, attenuated, form, loses part of its poisonous effect.

PASTEUR'S *weakening* of the virus of Hydrophobia was

effected on the same principle, assuming the virus to be an animate ferment, of which PASTEUR'S own experiments are the best proof. Such a ferment may be compared with a venomous plant, and if it be inoculated from animal to animal it will be, so to say, *animalised*, but—and this is what PASTEUR has failed to comprehend—only for the kind of animal on which it has been inoculated. PASTEUR employed rabbits for this purpose, and I do not for a moment doubt the accuracy of his observation that the oftener the virus was inoculated, the weaker was its effect on the rabbits. PASTEUR thus erroneously assumed that the ferment of Hydrophobia was also weakened for human beings, which is not the case. The weakening pro ceeds from the "specific matter" of the creature in question, and from this alone, and the "specific matter" of human beings is radically different from that of rabbits.

If the poison which PASTEUR desired to weaken had not been an animated ferment, he would have succeeded in attenuating it by the method he adopted. He failed to accomplish this, because these animated ferments have the property to multiply enormously, when transmitted to a living body. If the virus of Hydrophobia had been inanimate, a drop of it introduced into the rabbit would have been distributed in its tissues, and ultimately a high degree of attenuation might have been secured. But inasmuch as the virus is animate, as soon as it is introduced into the tissues of the rabbit the germs multiply exceedingly, and the matter taken from the inoculated rabbit is in no degree *attenuated* from the original poison derived from the dog, while it is *weakened* only for other rabbits, and not at all for human beings.

To weaken the ferment of Hydrophobia for human beings, it would require to be "humanised" (a proposal which, of course, no one would seriously make), and not, to use a

parallel word (from *lepus cuniculus*, the rabbit), "cuniculised" That a ferment of Hydrophobia which has been weakened in rabbits can be used with success as counter-poison for this disease in rabbits seems to me theoretically probable; but that the ferment thus weakened can be successfully used for human beings is theoretically improbable, and PASTEUR'S failures are proof against this assumption. I feel no doubt that not only will the "cuniculised" ferment fail to counteract Hydrophobia in human beings, but that when the disease is not present this treatment may actually generate it.

In diseases due to ferments, the question of *tendency* is the first to be considered; this is formed by the presence in the body of matters which can easily be removed from it by use of the sweating bath, and thus the ferment is deprived of its nutriment.

I therefore recommend prompt recourse to this simple and tried remedy in cases of bites from animals which may be rabid or venomous.

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